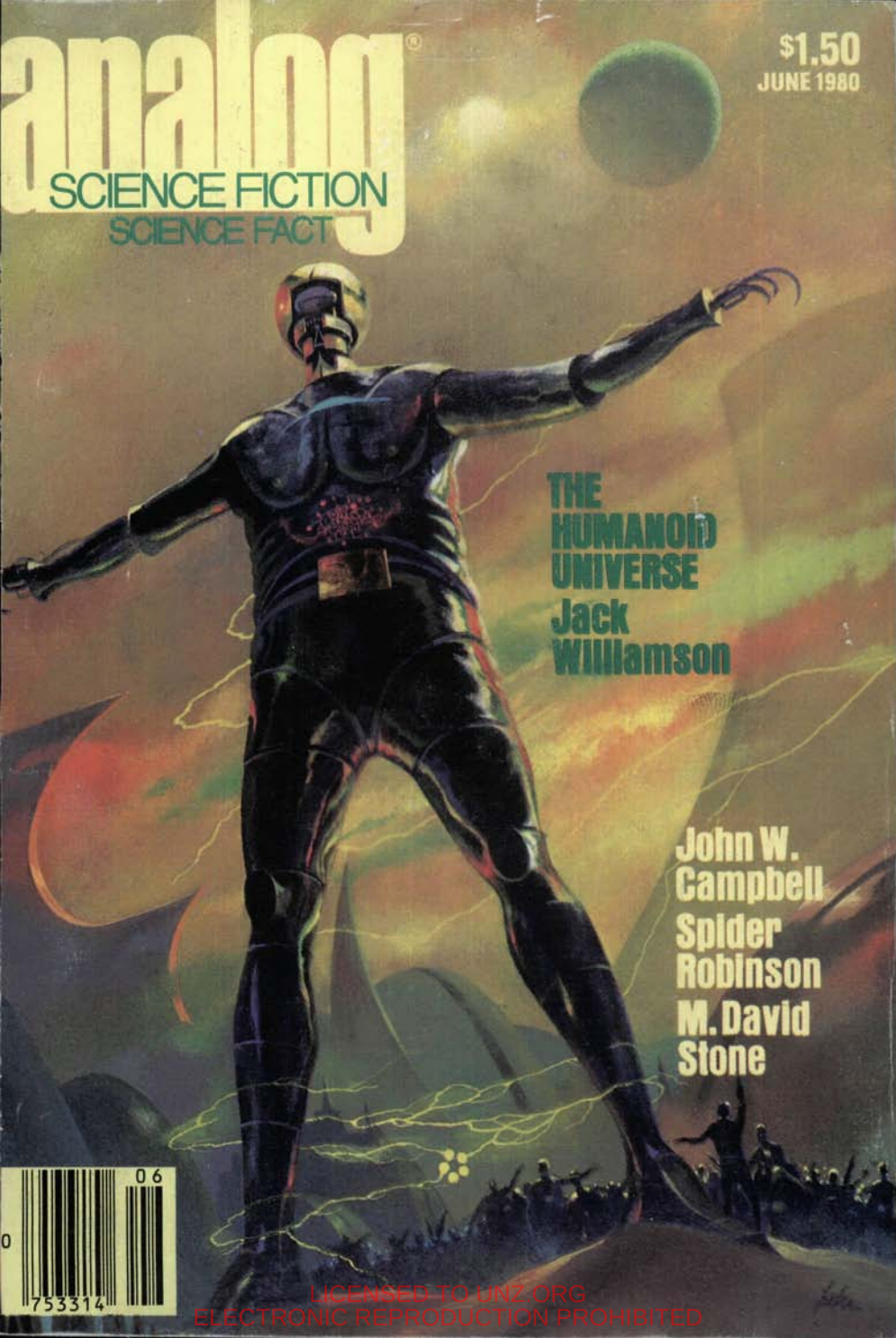

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GUEST EDITORIAL BY
JOHN W. CAMPBELL, Jr.

EDITOR'S NOTE: It's impossible to pick a "typical" editorial by John W. Campbell, Jr. They cover far too wide a range of both content and viewpoint. The following, though, illustrates a good deal of what Campbell was noted for—and though some of the numbers may have changed, the ideas deserve re-examination as much today as they did in August 1958.

hyperdemocracy

So far as I can make out, there is such a thing as an excess of anything you can name. There's the old gag that you can get drunk on water...just as you can on land. But it's also true that you can become intoxicated by too much water. Hard to do, of course, but it's a medical fact. Too much oxygen can produce quite a tizzy, too.

Too much truth, unmodified by good sense and understanding, can be destructive, also. The "catty" woman frequently uses truth as her weapon to hurt.

I rather imagine the following comments are going to call forth howls of wrath from a good many sources. Nevertheless, I feel that they constitute painful truths that need to be examined.

I propose for debate the proposition: "America is suffering from an acute attack of excessive democracy."

First, it needs to be determined whether or not there can be such a thing as excess of democracy—too much equality.

The original purpose of the democratic concept was to establish the value of the individual—the right of the Freeman individual to think for himself, and to work for himself, as against the older concept of the individual as an entity owned by the state. The original intent of democracy was to allow the individual to achieve the full development of his individual potentials, unlimited by such arbitraries as aristocracy-of-birth, or other arbitrarily imposed restrictions. That all men were to have equal opportunity to develop their own valuable potentials.

In hyperdemocracy, however, the democratic concept is subtly, and malignantly, shifted to hold that all men should *be* equal—that *individually achieved* developments should be equal.

This is *not* the same thing as equality of opportunity, since it actually imposes an arbitrary limitation on the right of the individual to achieve his maximum potentials.

Equality of opportunity, however, is exceedingly hard to demonstrate!

Suppose two individuals, Tom and

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Dick, are given equal opportunity to develop their individual abilities. Tom winds up a millionaire, and Dick winds up on a skimpy retirement pay. The objective evidence clearly shows that Tom and Dick did not have equal opportunity, doesn't it?

Yes, it does. Tom had superior opportunities; he had the gift of learning very rapidly, so that, exposed to the same information sources, and the same situations Dick was, Tom learned fifteen times as much. Tom, going to the same school Dick did, learned that Columbus discovered America...and that Leif Ericson probably landed in Labrador five or six centuries earlier. That various French and Spanish pioneers explored the area of the western United States, but that the Lewis and Clark expedition was more important.

And Dick, having answered the school examinations properly, knew that he had learned what the proper citizen was supposed to learn.

But Tom, having answered the school examinations the same way Dick did, learned something quite different. "It doesn't do much good to open a pathway if people don't want to go there. There's no point in discovering a continent until people need a new continent. There's no use exploring a territory until people are present to move in, and want a new territory to move into." That was a great help to Tom in later life, when he was organizing the companies and enterprises that made his millions.

Dick had the same opportunities to learn...but Tom had an unfair, arbitrary opportunity not given Dick. Something *not* education, but inherent, gave Tom a greater ability to learn from any data offered him.

In hyperdemocracy, inequality of results is considered proof of inequality of opportunity. Inequality of what level of opportunity? Is innate, God-given ability undemocratic? Something to be suppressed, punished, ground out, so that we can have absolute equality?

But this isn't democracy! Democracy implies giving each free individual the right to develop his own talents as best he may—so long as those talents are not destructive to others. (Talented assassins will be suppressed, of course.)

To hold that results must be equal is to violate the central intent of true democracy—that each individual shall have equal opportunity to develop his abilities.

A hyperdemocracy, if such existed, would have the characteristic of seeking to force individuals to conform to an arbitrary norm—neither rising above the "proper" level, nor allowing them to lag below. It would seek to punish individuals who advanced beyond the norm—who showed "undemocratic" superiority of actual ability. It would confuse superior *ability* with superior *opportunity*. It would insist that no individual had any right to marked superiority of achievement—that the true proof of democratic equality of opportunity was equality of results. That innate

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difference did not, and of a right should not, exist. That anyone who claimed innate differences did exist was undemocratic—and that anyone who demonstrated that such differences existed was criminally undemocratic, and should be punished for his anti-democratic actions.

Lopsided superiority, with compensating hopeless deficiencies, would be tolerable, of course. A Steinmetz, a brilliant cripple, wouldn't be anti-democratic, because, of course, his physical deformity makes him average out not superior. The genius must be crippled, one way or another, either physically, or mentally, or he is unacceptable in a hyperdemocratic concept. The brilliant scientist must be an oddball of some sort, or he's unacceptable. To suggest that individuals exist who are genuinely, innately superior is, in the hyperdemocratic concept, intolerable.

And I'm defying every rule of our present hyperdemocracy by bringing these propositions into the open. I'm suggesting that there are human beings who have innate, unmatchable-by-education talents of genuine superiority that you haven't got a prayer of achieving—things that neither training, practice, education or anything else can ever give you or me.

First: A hemophiliac bleeds by reason of a genetic anomaly. It's not due to training, education, or lack of opportunity to learn something. You don't have that defect. Then, with respect to the hemophiliac you have an innate superiority, due to genetic difference—and it is unarguably a survival superiority.

You didn't earn that superiority; it was given to you by your ancestors. (They, one might say, earned it.)

In the same way, a Peruvian Indio can play football at 15,000-foot elevation. You can't. Even if you trained for five years, you still wouldn't have the fundamental biochemical adaptations that generations of selective breeding have given the Peruvian. He can get a lower oxygen-tension, and get successful displacement of the CO_2 from his blood. You can't; you never will be able to. It's not learnable. I can't, and don't kid myself that I can.

I saw an article on the biochemical adaptations of the Peruvian Indios in the *Scientific American* a couple of years ago; it was a fine piece of objective reporting...down to the last paragraph. In that, the researcher felt forced to specifically state that it was not proper to conclude that it was a genetic superiority—that, in fact, any human baby born and raised at 15,000-foot altitudes would undoubtedly display the same type of adaptation.

That last statement is no doubt true. Their tests showed that an American engineer who'd been living at 14,000 feet for many years was able to perform on their treadmill for only eight minutes; their Indio subjects had worked on it for as long as ninety minutes. If a man in excellent health, after years of adaptation, could manage only eight minutes of work on the treadmill—could a woman survive the period of labor in

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childbirth? Conclusion: undoubtedly a child born and raised at that altitude would show the Peruvian Indio adaptations. He'd *be* a Peruvian Indio; no woman of other racial stock without those adaptations could bear a child there.

What made the scientist who did that report add that gratuitous—and invalid!—statement that the data did not indicate an innate superiority of altitude adaptation?

In a hyperdemocracy, we don't acknowledge innate differences not correctable by education and training. Not even if we've found one... unless we want to raise the wrath of misguided super-democrats. And universities don't, these days, like to annoy the populace.

(How long has it been since an American University raised a real, angry debate by a firm, open statement contrary to popular ideology? The only time our modern, remarkably spineless Universities get into controversies is when they get caught in a squeeze between two opposed groups of the populace. The conflicts are never of their own doing! The Universities that were, once, the leaders of thought are, today, remarkable for their fast footwork in following public opinion trends.)

It's a self-evident fact that mammalian species can be bred for special characteristics; what men have done with dogs, horses, and other animals is rather incontrovertible evidence that selective breeding can, and does, produce marked variations of type.

Is Man a mammalian species or not?

There are sports, mutants, among other species. Only a hyper-democratic philosophy could maintain that there aren't among men, too!

The essence of hyperdemocracy is the denial of the right to difference—the *denial of individuality*. In that, it is the exact reverse of true democracy; democracy insists on the rights of the individual. Hyperdemocracy, in essence, says "The rights of the individual are sacred...but there aren't any individuals, because we're all just alike."

"Togetherness"..."belonging"..."conforming"..."adjusting to your environment"...these are all denials of the propriety of having individuality.

The United States has, I suggest, fallen for that philosophy, hook, line and sinker. And it's sinking us. Our educational system is accepting the philosophy of the convoy—"Proceed at the maximum pace of the slowest member"—with disastrous results. "Togetherness" is a fine idea...but not when it means slowing down the class to the pace of the high-grade moron that happens to be the slowest member. Mustn't drop the incompetent back a grade; it might damage his precious ego.

Yes? What's the resultant crawl doing to the egos of the stultified bright students?

When a "Social Studies" teacher assigns *three* pages of text, for studying every *two* days, in a sixth-grade class ...whose precious, incompetent ego is being protected? And at what cost?

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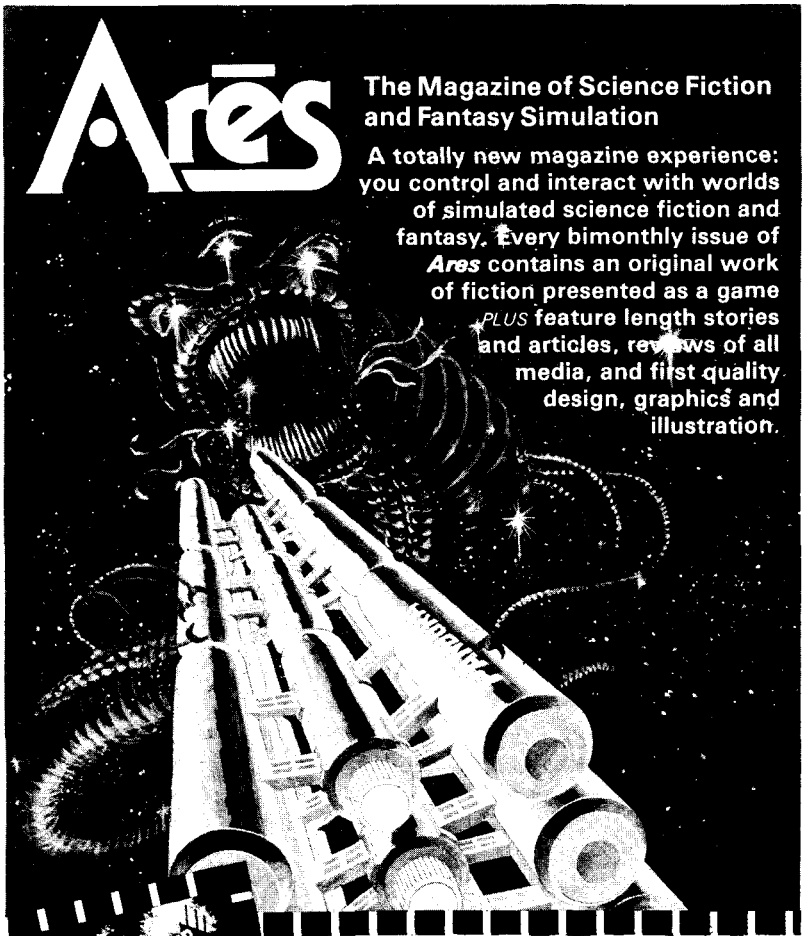

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And what's with this "Social Studies," anyway? They used to call it Geography, and History, and Civics, make it three courses, and require that the students learn something, or get dropped back a grade.

So it's a painful shock to a child to be rejected from his group! So what? If he's earned it, why should he not get a boot in the rear? He's going to get some rugged shocks when he gets out of that educational system!

Or...wait, maybe he isn't. They're certainly doing everything possible to make the real world of adult work just as cushioned and protected as that cockeyed educational hothouse. Advancement in a job isn't to be determined by individual ability, but by seniority. It isn't fair to advance a young man over twenty others who've been with the company for a dozen years of faithful service just because the young man happens to be a clear, quick, fruitful thinker, and accomplishes things, is it? Would it be democratic to let a young man develop his individual abilities like that, at the risk of injuring togetherness? No...in our adult world of real work, we're rapidly installing the principle our schools have established; each individual must be promoted with his class, incompetence to the contrary notwithstanding.

But the shock is coming just the same. Those nasty Communists in Russia have the idea that they can overtake the United States by setting the pace not at the convoy pace of the maximum speed of the slowest—but at the maximum speed a working quorum can maintain. Hard on the slower ones, of course...but it'll be even harder on other nations, won't it?

There seems to be a basic law of the Universe that is correctly and accurately expressed in our Declaration of Independence in saying that among the inalienable rights of Man is the right to the *pursuit* of Happiness. The framers of that document had more sense than our modern educational philosophers; they did *not* say that a man had a right to Happiness.

The law of the Universe seems to be, "You have a right to try anything... but that doesn't guarantee the right to succeed!"

From the hyper-democratic viewpoint, unusual achievement is *de facto* proof of antisocial behavior. It is not proper for any individual to achieve markedly more than his neighbors by ability; only lucky accidents—which could happen to anyone—are tolerable, because they are unearned benefits.

If you doubt that is the present philosophy in the United States, notice how it is embodied in the income tax laws. A "tax" of ninety per cent or more is not a tax—it's a confiscatory fine. It's a punitive measure, intended to make the culprit cease and desist. Which any relatively sane individual would, of course, do. The present income tax laws are designed to prevent any individual *earning* by his own productive efforts, any great economic power. Any great economic reward for out-

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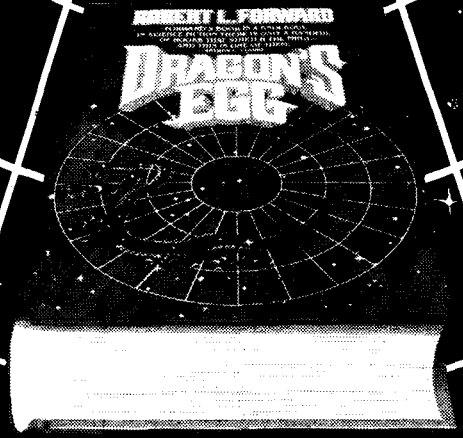
A GIANT STEP FORWARD



Once in a while, a novel appears that has everything unique to science fiction—a brilliant new idea, honest extrapolation of real science, a gripping story with fascinating alien characters, and an indefinable but essential sense of wonder. Such a novel is Robert L. Forward's story of life on a neutron star...

"Forward's book is a knockout. In science fiction, there is only a handful of books that stretch the mind—and this is one of them!" —Arthur C. Clarke

"Robert L. Forward tells a good story and asks a profound question. If we run into a race of creatures who live a hundred years while we live an hour, what can they say to us or we to them?" —Freeman J. Dyson, Author of *Disturbing the Universe*

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standing ability. He is punished for insisting that he has exceptional talents that *earn* reward—insisting on it by that most obnoxious of all methods, demonstrating the ability.

However, it's not antisocial to get rich by a lucky accident; it's *earning* advantages that's obnoxious. If they accidentally happen to you, that's not antisocial. Therefore the capital gains tax is a true, reasonable tax—about twenty-five per cent. Thus if you are lucky, and accidentally discover an oil well, and make ten millions or so, that isn't *earned* income, and you aren't punished for it. There's only a twenty-five per cent capital gains tax.

If, however, you make an invention, and license the invention to many companies, and the invention is of great value so that your royalties amount to $10,000,000—that's antisocial. It's well-earned income, and is punishable with a ninety per cent fine. That's what you get for trying to be smart, instead of merely lucky.

There is, of course, the fact that patents represent an effort to achieve an advantage by being smart, by thinking out problems and devising ingenious solutions. That, obviously, is anti-hyperdemocratic, and would be attacked in a hyperdemocracy.

A patent is a license to sue; it's a government-granted right to a time-limited monopoly, enforceable by the courts.

If the courts show a consistent record of enforcing that monopoly, a consistent record of validating the concept of patents, protecting the inventor, the tendency to violate a patent will be small. But if the courts show an acute disinterest in protecting the inventor's rights, if they usually disallow patents brought before them, patent-violators have little reason to worry, and a strong temptation to violate the inventor's patent.

The record of the United States courts over the last two decades indicates that an inventor can, generally, expect his patent to be invalidated if it is brought to trial. Bringing it to trial is extremely expensive, and offers little probability of eventual reward.

The result is that patents aren't of much value to individuals; only large, well-heeled corporations can afford to use the pressure of legal harassment to make their patents work.

The Department of Justice is equalizing that situation, however. The Bell Laboratories and IBM, two of the greatest industrial research and development organizations, have already been forced, by anti-monopoly suits, to surrender their patent rights. The Justice Department is currently gunning for RCA.

There's a lot of wild hullabaloo about the United States educational system, currently. Well, the nation is, after all, a democracy in the sense that the votes of the majority determine what shall be done. The clear vote of the majority over the last decade has been "We don't want leaders who show us what we *need;* that's frequently uncomfortable. We want leaders who give us what we *want.*"

People *want* the proposition "My

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little Johnny is just as smart as anybody else, even if he is somewhat of a moron," to be validated. They wanted it, and they got an educational system based solidly on that postulate.

They did not want an educational system based on the proposition, "Those who can't think, can't graduate." That was the type of system we did have. It made a lot of people unhappy. And that's terrible, of course, because most people know that the Declaration of Independence guarantees us the right to Happiness, doesn't it?

No, it doesn't. The right to try *and fail* must be protected just as rigorously as the right to try and succeed.

We've tried to wipe out the right to fail...and have very nearly wiped out the right to earned achievement.

I was looking over a current Social Studies textbook; in it there is a recitation of the characteristics that made America great. One that interested me was "Americans Will Try Any Job."

The Pilgrims tackled a big one, when they tackled the howling wilderness of New England...and they won. George Washington and his fellow rebels took on the greatest military power of the time, and won. Pecos Bill, and Paul Bunyan were willing to tackle anything—as were that era's cowboys and lumbermen.

The United States of today, however, got the atomic bomb first largely because of a highly arbitrary, authoritarian, one-man decision by Franklin D. Roosevelt—who took an immense chance in tackling that job.

We got pushed into tackling the hydrogen bomb, out of pure fright. We knew that the Russians were taking on the job.

We didn't tackle the satellite problem—we teased it.

You can cite history to show that America is a great, courageous nation, willing to tackle the big jobs, and fight its way through.

Yes...but that's the history of what our *fathers* were. What's the son like? You're not citing *our* achievements when you cite history—you're citing someone else's achievements.

What have we done lately?

That's a big set of oars old Pop carved out; we can't rest on things that size! And it looks like Son is a delicate flower, who must be protected from the cruel shock of getting his ears slapped down when he muffs a job, or being passed over if he's incompetent.

We've gotten so hyperdemocratic, we've gone full circle. The individual's rights are sacred...except for the right to be an individual, which is antisocial.

No one has a right to be different. He must be adjusted until he conforms, and appreciates togetherness.

Personally, I can't feel the slightest sense of togetherness with dopes. Nor do I feel I have an inalienable right to inflict my presence on geniuses.

And I don't like hyperdemocracy a bit better than tyranny; each denies the most important of all individual rights—*the right to be an individual!*

THE EDITOR.

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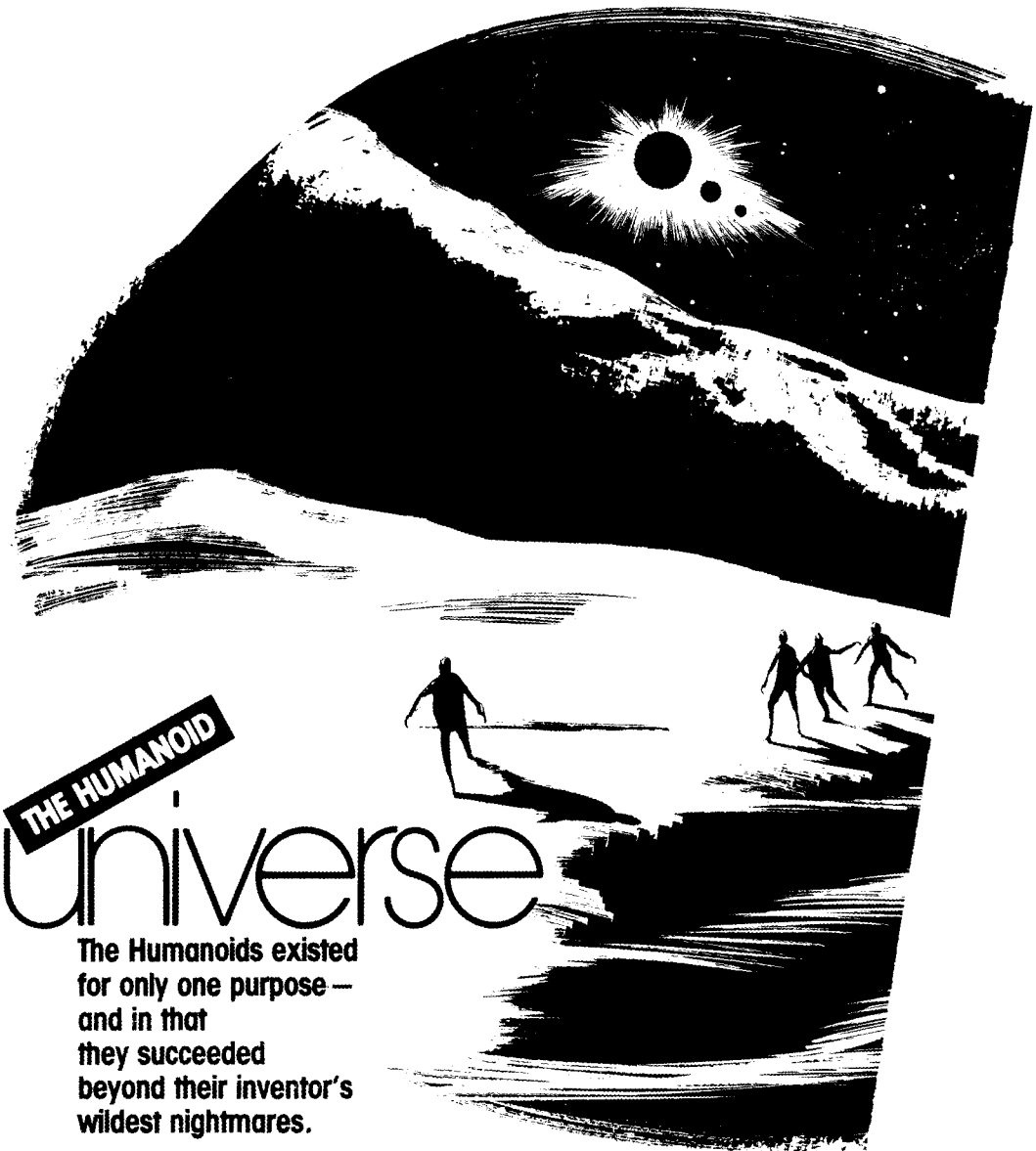

THE HUMANOID universe

The Humanoids existed for only one purpose — and in that they succeeded beyond their inventor's wildest nightmares.

JACK WILLIAMSON

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When he stepped off the ramp at Terradeck, his father's wife was waiting, muffled so heavily in a hooded winter cloak that he hardly knew her. She hugged him hard. For a moment, smiling through her tears of delight, she looked young again, strong and happy, but then he saw her haggard pallor and felt the weight of desperation on her.

"Don't talk." Her words were soundless. "Just come with me."

They picked up his bag and took the Terratown tubeway. Halfway there, she led him off the pod and up through a surface entrance. Here so near the pole, with Summersend past, the air was already sharp with frost. The blood-red sun barely cleared the black north horizon and the summer shrubs were naked sticks jutting out of the first thin snow.

An icy gust struck him, and Nera Nyin was gone. Through all the long flight from Malili, he had clung to his memories of her and her planet, but now Kai's gritty chill had dissolved them like a dream. The braintree's mystery, the bloodrot's menace, his last hope of some safe haven from the humanoids, all lost behind him. Aching inside, he bent into the wind and caught Cyra's match-stick arm.

Nobody else had got off with them. She frowned around them and waved toward a walled summer villa on a little hill above the station.

"What did you learn—" Her breath was short. "Out on Malili?"

"Not much." He leaned to shield her from the wind. "The planet baffles me. Even if I was born there."

"Brong?" Her dark-shadowed eyes asked more than her papery voice. "Bosun Brong?"

"He put me up at the Lifecrew station. Friendly enough in his peculiar way—but those golden hands!" The chill bit deeper. "Sometimes they frighten me."

"Did you find—" She looked up to search his face. "Humanoids?"

"A rhodo source." He shrugged uneasily. "Couldn't reach it. Brong wouldn't drive me there or even let me leave the perimeter alone."

"Bloodrot's the reason." Her bleak features twitched. "That's what got his hands."

"Bloodrot and rockrust." He could see the many-colored rust again, a fantastic fragment of that lost dream. Splashed everywhere outside the sanitized perimeter, crumbling every metal except gold to foul blue mud. "Brong said no machine could last to reach that rhodo site."

She tugged him up the frozen slope toward the villa. Shivering a little, he began to share her dread. Though many centuries gone since their forebears fled the humanoids on the worlds of the runaway sun, those implacable black machines would never forget the built-in benevolence that drove them everywhere, to serve and obey and guard mankind from all they saw as harm.

"Your father didn't want—want us to call you." He bent to catch her broken whisper. "I suppose it hurts his pride to admit—admit how much

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we need you now."

"Why now? Nobody on Malili seemed to know what's going on."

"They're—here!"

"The humanoids?"

"Already this side of Malili." He had paused, but her quivering fingers gripped him harder, urging him on. "We were afraid they would intercept your ship."

The shallow snow crunched under their boots and the purple sky ahead seemed suddenly foreboding. When they came to a stone bench niched into the villa wall, Keth made her stop to rest. He sat and caught his breath.

"We've been trying." Warily, she watched the path behind. "Trying everything we can. But people won't believe the humanoids are real—and now we're hunted for murder. Bridgeman Greel was our last hope for help. An old admirer of mine. Wanted to marry me, back at the Academy. Still too sentimental to turn us in. I begged him to listen."

Her bent head shook.

"He wouldn't, not really. If the humanoids hadn't found us in a thousand years, he didn't think they'd find us now. Wouldn't even watch our rhodar detector. Still half convinced your father's what the shipwatch calls him: Con man and killer!

"For my sake, he did set up a hearing for us. A few space engineers and junior fleet officials—he promised they wouldn't talk. In spite of the promise, the shipwatch picked up Nurse Vesh. Pretty harsh with her, but she managed to warn us. We packed up the rhodar and got away. So here we are.

"Greel's gone on to Northdyke. He's letting us hide in the keeper's lodge, but our welcome's pretty thin. Officially, if the shipwatch gets back on the trail, he doesn't know we're here. So now it's just us—to stop the humanoids!"

Shivering, she pushed herself off the bench.

"Just us, Keth."

They found his father in the tunnel shop under the keeper's lodge. He stood up when they came in, as sternly straight as if he expected a formal Crew salute. Keth took his hand, shocked at its fleshless yellowness. Still the man's grip was firm.

"Well, Skipper!" He tried to smile, but all Keth saw was the blue spider-scar crawling up the white stubble on his cheek. "We need you now."

For a moment Keth couldn't speak. His throat hurt and tears burned his eyes. Now that he knew the story of his mother and the scar, he understood and forgave many things. He could have flung his arms around his father, but this unbending man wanted no embrace.

"Vorn did send two kilograms of palladium." He nodded at the worn spacebag. "And I was able to pinpoint one rhodo source. That braintree east of the Zone my mother died trying to reach—"

His father stiffened, recoiling from him, and the scar shone whiter than the untidy beard around it. He saw Cyra start, as if that tragedy were new

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to her. Recovering quickly, she begged him to open the bag.

"Enough to shield a city." With a pale smile, she lifted the little white ingot in her wasted hand. "If they give us time."

They showed him the new rhodar unit, standing on a bench. A clumsy-seeming toylike thing made of mismatched parts joined by heavy cables that spilled like vines across the floor. A luminous needle in a little holo tank swung across one curved scale and rotated above another.

It was soundless. All three stood around it, too breathless for talk. Cyra's lean hand shook at the controls until she stopped to massage it. The needle hung motionless at first, while glowing green shadows crept into the tank. Suddenly in focus, they formed a tiny image of the device itself, a smaller toy. Their own doll-forms moved in around it, quickly dwindling, lost in an instant beneath the green-shining shape of the lodge, the doll-house villa above it. The villa shrank, the model city shrank, the diminished planet shrank until its toy sister world swam into the scan. The needle wavered. Cyra wrung her thin blue fingers and bent to make another fine adjustment. The needle steadied, pointing not quite at Malili, but at the moving rhodo source.

"The same intense source, which has to be a humanoid ship. Speed no longer tachyonic. Already this side of Malili."

"You'll have to act fast," his father said. "And hope for better luck than you can reasonably expect."

He learned then that he was to go on to Northdyke and try again for the aid they had failed to find.

"Take your own rhodo compass," Cyra told him. "To demonstrate the danger. When the ship gets close enough, you'll be able to pick it up."

He stayed with them that night while she worked late, assembling a hand weapon for him. A shielded monopole in a flat pocket case no longer than his finger.

"Keep it with you." She showed him how to activate it. "But don't use it unless you must. It ought to knock out a humanoid at close range, but those farther away would detect the rhodo field."

"What's close range?"

"A few meters, I hope. One or two at least. Just point it and push the slide. If it works, you stop the humanoid."

"If it doesn't, you're in trouble." His father frowned, absently fingering the blue-ridged scar. "Their top priority has always been their own defense, and the only danger they know is rhodo attack. Human beings aren't allowed to play with rhodo toys."

Cyra didn't want to risk the rhodar again, for fear the humanoids might already be near enough to pick up its search beam, but she thought his tachyon compass would still be safe. They carried it up into the dim and frigid suntime for a trial. Alive at once, the pointer crept slowly along the jagged north horizon to overtake

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and pass the dull-red sun.

"They're here," she whispered. "In orbit now!"

He rode the tubeway north. With the Bridge about to meet, Northdyke was crowded, the hotels filled. The shabby room he found was off a disreputable tunnel under a factory district beyond the exclusive Meteor Gap suburb.

Cyra had given him Greel's office address in the Bridge complex, but the receptionist there said he was away, attending a meeting out of the capital. At the Vorn headquarters, a security officer said all the top fleet executives were at an emergency meeting out of the capital. When he called the regent's residence, a secretary said the regent was out of the capital.

At last, next morning, he found Greel in. An impatient, wheezing, fat-faced man, hard of hearing and loud of voice, the aging Bridgeman received him with a scowl and kept him standing in front of a vast black marble desk.

"So you're Kyrone's son?"

"With news for you, sir. Urgent news from him and Cyra Sair—"

Not listening, Greel turned to peer and mutter into a hooded holocom.

He began again, "My father—"

"Frankly, I've heard too much of your father." Greel glowered at him. "A paranoid fanatic. Possibly a murderer. I feel no obligation to him. Certainly none to you."

"Sir, a tachyonic transport from the Dragon is now in orbit around Kai." He had brought the compass in his bag, and he stepped forward with it now. "I've got scientific evidence—"

"Stand back, Kyrone." Greel batted the air with a fat white hand. "I've heard your father's ranting about the wicked humanoids. A delusion as old as Kai."

"Cyra's a scientist." He tried to swallow his resentment of the old man's arrogance. "She has detected and traced the humanoid ship with rhodo—"

Greel was now frowning into his holocom.

"Listen, sir!" Desperate, Keth lifted his voice. "The humanoids took the *Kyrone.* They took the *Fortune,* with the Navarch aboard. They're back again. Let me show you—"

With an ironic grunt, Greel swung to him. "I've news for you, young man. About that object in orbit. It's the *Fortune* herself—"

"Sir!" Keth stared. "That can't be true—"

"Don't contradict me!" Greel's white fat quivered. "I've seen the Navarch himself. Last night at a confidential meeting at his summer villa in Meteor Gap. He's to address the Bridge today. Excuse me now."

Keth rushed to the Bridge chamber in time to push into the packed guest gallery. When Commodore Zoor appeared at last, escorting the aged leader to the podium, the sudden hush was almost painful.

"Old?" He heard puzzled murmurs. "He looks go young!"

The lawmakers rose to cheer. Keth

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stood with them, staring. In holo interviews, the Navarch had always been leaning on some younger aide, looking withered and infirm. Now he glided ahead of the fattish commodore, moving like a dancer.

"Fellow shipfolk—"

Smiling serenely, oddly casual, he strolled aside from the microphones and spoke without notes, his unaided voice pealing through the chamber with surprising clarity and power.

"We're glad to be back. Our long absence must have been a mystery. I understand that the holo people have aired reports that our ship was disabled by collision with a meteor or forced down in the jungles of Malili.

"The truth, however, is stranger. The history of our voyage will amaze you, and its outcome promises to open a dazzling new epoch in the history of Kai. I'll tell you about it, but first I must correct an old misapprehension—an unfortunate misconception of the humanoids."

He waited for a rustle of surprise to die. "Demon machines! That's how we've always been asked to see them—as part of the legend that our forefathers came here to avoid them. A tragic error, friends!" His head shook gravely. "Due, I suppose, to the destruction of our historical records during the Black Centuries.

"Friends, we've met the humanoids!"

Shock stilled the chamber for an instant, before the first scattered gasps swelled into an unbelieving uproar. The Navarch stood waiting, poised and clearly pleased, the dull old eyes that Keth recalled now strangely bright. At his commanding gesture, all sound subsided.

"In flight to Malili, the *Fortune* was just reaching escape velocity when we were overtaken by a humanoid craft—a tachyonic cruiser so large that we had been hauled aboard before we knew what was happening. Humanoid units came aboard to offer us the service ordained by their wise Prime Directive.

"They're beautiful!"

His lyric voice pealed against the vault. "You'll all be meeting them soon. Black, of course, but cleanly shaped and shining, swift and graceful in every motion, attentive even to unuttered thoughts, totally devoted to human ease and comfort. Now, as I recall their universe—the new universe that they've created for mankind—it seems a dream of paradise.

"They escorted us to see fairylands you can't imagine. Whole populations free of want and care and fear and pain, happily relieved of class and competition, living in the joy and splendor we have come back to promise you.

"Each of us found wonderlands where we longed to stay—grandeurs so dazzling, beauties so piercing, delights so enchanting, that leaving them was agony. Yet none of us stayed, even though we were offered the option, because the humanoids have promised to transform Kai.

"That's why we're back. To dispel your old fears, my friends, and deny

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the old lies. To welcome you into the humanoid universe. Tachyonic transports will arrive soon, and our old spacedecks must be modified to support their enormous weight. You, too, must be prepared. The service of the humanoids is never imposed. It must be fully explained and freely chosen.

"I beg you, friends, to reflect well before you choose. If you accept the humanoids, they can transform Kai into a more perfect paradise than any religion ever promised. If you refuse, they'll pass on and leave us alone."

His voice sank into a solemn pause.

"Without them, our future—without them, friends, we have no future. Our uranium and thorium will be exhausted. The promise of Malili has already faded, its tempting riches denied us by its hostile life and savage people, by its total deadliness. Our choice is simple—paradise or death.

"Think well friends!"

Beaming with that unbelievable youth and charm, he bounded off the platform. A staggered silence hung behind him, unbroken until the Bridgemen surged to their feet, most of them applauding madly but a few yelling questions he hadn't stayed to answer. Order of a sort came slowly back, spreading around one lawmaker who said he had been aboard the *Fortune*.

"Fellow shipfolk!" At last he claimed attention. "Please calm yourselves. We've no reason for alarm. The humanoids, I assure you, were never the devils of those unfortunate legends, but simply the best of all possible machines. The most efficient, the most versatile, the most powerful ever invented. They repair and replace themselves. The service they offer is totally free. They can't harm any human being, because they're all controlled by a higher law than ours, wisely designed to keep them faithful forever."

"Then why are we here?" some skeptic shouted. "Why didn't our forefathers stay to adore them?"

"The records are lost." He shrugged. "If our ancestors ever had any actual complaint against them, you must recall that the humanoids they encountered were early models that may have been less perfect than these.

"In the last thousand years, we're informed, they have improved themselves enormously. Their powers of motion and perception have been multiplied. Their computer plexus has become a true galactic brain. The annihilation of matter gives them literally limitless energy, which they devote to human good."

Smiling benignly, he waited for a murmur to subside. "Though I understand your apprehensions, I have seen these new humanoids. I've seen their universe, where many trillion human beings live their lives in perfect happiness and ideal peace, supported in bountenous abundance by trillions of willing machines—"

Keth was on his feet, seeking a way out of the jam in the gallery, but the ringing words caught him again:

"—surprises waiting for us. Many of us were elderly when we boarded the *Fortune*. Some of us infirm or ill.

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You'll observe that the humanoids have healed us. Understanding the human mechanism far better than we ever did, they tend it with skills never known to human medicine—"

Overwhelmed, he escaped from the chamber.

He stumbled out into the corridor, feeling battered. The Navarch's story was starkly incredible to him, but most of the Bridgemen had swallowed it whole. The old war against the humanoids had seemed forlorn enough before. Now, clearly, it was lost.

With no actual purpose left, he wandered through the mobs in the capital tunnels and rotundas, listening for what he could learn. Here and there he came upon others who had seen the humanoid universe, each set apart by that glow of joyous vigor. At one crowded corner, Commodore Zoor was on a news holo, announcing the advent of the new humanoids. Despite the fat, even he looked fitter, his puffy features grown somehow commanding.

"—total happiness!" Still hesitant and high, his nasal voice had acquired a new fluency and power. "The humanoids ask for nothing. They bring us everything. Friends, you'll learn to love them—"

Keth pushed out of the crowd and drifted blankly on, lost in thoughts of Chelni Vorn. Had she too come back on the *Fortune,* transformed into a humanoid evangelist? Her image aching in his memory, he wanted to call Vara Vorn to ask if she was there. Half angry at himself for the impulse, he shrugged it off. She was doubtless now part of Zelyk's total happiness.

It struck him that he must report to Cyra and his father. He found a holo booth and dialed their borrowed villa. For a long time there was no answer. Cyra came on at last, looking ravaged and deathly.

"Keth, don't!" Her hushed voice was desperate. "You'll give us away."

"I'm at a public booth—"

"They're smarter than you are."

"What have they done to the Navarch and—"

"Euphoride, maybe."

"What can we—"

"Try to hide. Wait for a chance."

"Can I—"

"Get rid of your compass, where they won't find it."

"I want to help—"

"What can you do?" Her whisper rasped with savage scorn. "They'll be everywhere. They know everything. They can do anything."

"Tell my father—"

"Get off the line—now! Don't call again. We won't be here."

Her haggard image winked out.

Stumbling away from the booth, he tried to understand. They must be as utterly stunned as he was. When the humanoids came swarming down from space, Bridgeman Greel's reluctant aid would surely end; he might even turn them in. There is nothing left for them to do, certainly nothing he could do for them.

Yet he felt a bitter need for his father's sternly silent courage and her own warm wisdom. He had lost them,

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just when he was coming to know them. To prove his love, all he could do was avoid them. The unfairness of it rankled.

It was late when he got back to his own shabby tunnel, now nearly deserted. Cyra's terse warning had left him afraid of a trap, but he had to do something about the tachyon compass. Breathless, gripping the tiny weapon she had made him, he pushed inside. The room was empty, the holo flashing. He punched for the message.

"Keth, darling!" It was Chelni. Her hair looked darker and sleeker and longer, her eager eyes brighter. Aglow with that radiant joy the humanoids somehow ignited, she had never seemed so lovely. "I must see you, dear. Come to me at Vara Vorn. Hurry, won't you?"

He replayed it twice, uncertain what to make of such an unreserved invitation. In all their lifetime of friendship, she had never quite forgotten that he was not a Vorn, had never seemed so freely unrestrained, never so eager to see him.

His heart was suddenly thumping. Though he had already heard far too much about the mechanical enchantments of the humanoid universe, her burnished beauty had seized his emotions. The weariness of the long day forgotten, he pried a ventilator grill off the wall and pushed the compass up the duct and out of sight. The grill replaced, he changed his shirt and rode the tube to Meteor Gap.

The great winter gates of Vara Vorn stood open wide as if to welcome him. Outside the medallioned summer gates, he paused again. A breath of apprehension brushed him, but he drew his shoulders straight and then touched the bell.

"Darling!"

Chelni herself came darting out through the tall silver doors, looking taller than he recalled her, her firm chin not quite so stubborn, her eager face more vivid. In a sheer scarlet lounging robe more daring than she had ever worn, her figure seemed finer, her ripe breasts higher.

He stood breathless, caught by her new allure.

"Keth! Darling!" She caught both his hands with hers. "Come on in!"

She pulled him against her, opening lips lifted to his. Sheer astonishment held him rigid until she turned, laughing at his hesitation, to pull him inside.

"If I seem different, dear, it's because I've seen the humanoids." The voice was still her own, yet stronger than he recalled it, more musical, more intimate. "I want you to meet them as soon as we can arrange it. When you know them, you'll never be the same."

Certainly she was not the same. He had stopped in the vaulted entry hall, staring at her in spite of himself, but she gave him no time for wonder.

"Let's have your jacket."

Her bare arms were suddenly around him, helping slip it off. Her scent drenched him, a penetrating musk, too sweet and too strong.

"Darling, don't you like the difference?" Her slow tones caressed him

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with a husky warmth he had never heard. "You know I've always loved you, Keth, ever since I first saw you in the swabber class at Greenpeak. I used to grieve because I couldn't be more free with you—because of all I owed the family and the fleet. We can both be grateful that the humanoids never demand such painful choices between duty and desire.

"So let me see you darling!"

Tossing his jacket to a chair, she caught his shoulders to hold him facing her. Her wide eyes swept him, black pupils dilating.

"If you feel overwhelmed, I can understand." She pulled him impulsively against her to brush his mouth with hers. "I remember how I felt when I first saw them trooping aboard the *Fortune*. Lovely, really, but so new they frightened me."

She released his shoulders but clung to his hand. "Darling, you look worn out. Hungry, too. This must have been a dazing day. Let's find something to restore you."

She led him out of the entry, down into the magnificent winter hall where tall holos of Vorn admirals and Bridgemen frowned upon glass-cased models of Vorn tunnel-cutters and Vorn reactors and Vorn spacecraft. He grinned faintly at its gloomy splendor, recalling his miserable discomfort at her birthday party, so long ago in the summer hall. She pulled him quickly closer, and her quizzical smile made her look fourteen again, at least for an instant.

"All ours tonight," she whispered. "My aunt's away at the Navarch's all-night celebration and the staff has a holiday."

In the largest kitchen he had ever seen, she piled a tiny table with meats and fruits and sweets his quota card had never allowed, and opened a bottle of sparkling wine she said had been a gift from the Navarch himself.

Though the juices were flowing in his mouth, after the first few bites he forgot to eat. She sat too close. Her perfume was too powerful, her scarlet wrapper too sheer, her whole allure too overpowering. Overcome by everything, he couldn't stop staring.

"What's wrong, dear?" She leaned disturbingly nearer. "You aren't afraid of me?"

"Of the humanoids, I am." In spite of himself, he shrank a little from her. "I simply can't believe they're so wonderful and good as the Navarch says. Everybody on the *Fortune*—" He was trying to smile, but dread crept into his voice. "You seem—brainwashed."

"The wrong word, dear." Her wry frown was both reproving and entrancing. "An ugly term, unfair to them and even to us." Gravely, she filled their glasses. "I was afraid you wouldn't understand. That's why I sent for you. Let's drink to their wise Prime Directive.

"Darling, it has set us free!"

He had seldom tasted wine, because students got no quota points for alcohol. Uncertainly, he sipped. Not so sweet as he expected, it burned his tongue and stung his nostrils. An ex-

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citing aftertaste lingered in his mouth.

"I'm terribly sorry we had to quarrel, back at Crater Lake." Her voice sank huskily, gently penitent. "Can't you forgive me?"

"Have I been wrong?" He leaned toward her till that old dread checked him. "If I dared believe—"

"I'll convince you."

"If you can—" He sat straighter, grasping at a thread of unexpected hope. "There's so much I want to know. Can you tell me if the humanoids now have probes or stations on Malili—"

"Pure fable!" In scorn of the notion, she tossed her sleek hair back. "The sort of silly myth we must expose."

"There are facts beneath the myth." He frowned against her mockery. "The humanoids are rhodomagnetic, and rhodo sources have been located at Malili—"

"Where on Malili?" Her head bent abruptly toward him, wide eyes peering, pupils shrunk to hard black points. "Who detected them?"

A shock of fear had frozen him. Was she already the sort of secret agent she had been scoffing at? Had he already betrayed Cyra and his father?

"My mother—" Desperately, he fumbled for words that might repair his indiscretion. "She thought the braintrees were rhodo—"

"Braintrees?" Her tight voice sharpened. "What are they?"

"The natives call them—" He checked himself, in fear of another betrayal. "They call them something else. I forget the word."

"Why did she believe they are rhodomagnetic?"

"I couldn't guess." He tried to make his shrug seem casual. "Maybe something in the old Crew files. I never knew."

"Did she have equipment? Actual rhodomagnetic equipment?"

"I doubt it. No point in wondering now. Whatever she had was lost with her in the jungle."

For another breathless moment she leaned to watch him, silent and intent. Trying to smile, he felt his stiff limbs tremble, tasted cold terror in his throat. He couldn't speak or move or even think.

"If that's all—" She drew slowly back, speaking more softly. "You had me alarmed for a moment. You see, the humanoids have been attacked by misguided scientists trying to change their wise Prime Directive, or even to stop them altogether. Something too dreadful even to think about!"

Shuddering, she tossed her dark head. "Let's relax. Forget about the humanoids."

She refilled their glasses.

"Trust me, Keth," she begged him softly. "It's so really grand to be back with you. In love again—the way love should be, with no need to worry about anything or anybody else."

"What about the Commodore?"

"My Cousin Zelyk?" Her tone turned hard with contempt. "A stupid lout all his life. Reeking with scent to cover up his body stink and slobbering with his disgusting lust. Some things the humanoids can't change. He's still

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nothing but an awful stupid lout."

She slid his glass toward him.

"So let's forget the Commodore." Her voice sank. "Let's talk about you. I guess you're a graduate now. Tell me what you've been doing."

He sipped cautiously, searching for something that would not endanger the Lifecrew. Again that hot sharpness lingered in his mouth.

"I left the Academy," he said. "Went out to Malili. Hoping to find some clue to the fate of the *Fortune*—"

"Hoping to rescue me?" Her warm hand covered his. "Thank you, darling!" In a moment she was graver, her face speculative. "I imagine the humanoids will want to bring all our people home. They won't need anything from Malili or be needed there. The naked natives can have their planet back.

"But we were talking about you." Her smile grew tender. "I need to know you better, Keth. You and your family. I barely met your father and Cyra. Where are they now?"

The question disturbed him a little, because she seemed too eager, leaning too close, her eyes too intent. He reached for his glass to make time to think, but suddenly he wanted no more of that hot tartness. Could the wine be drugged?

His hand shook, and a few drops spilled.

"Don't you like it?" Her concern seemed too quick. "An excellent vintage."

"I'm just clumsy." He fumbled for his napkin and mopped at the table.

"Sorry," he apologized softly.

"We were talking about your people."

"We're out of touch." He felt a surprising surge of confidence. "You know we've never been close. A voicecard every month or so. Never much news."

"Maybe I have news for you." Her quick voice brightened. "I got your address here from a receptionist at the fleet. When you were so long getting back to your room, I asked around again. Bridgeman Greel told me you'd called on him. He said Cyra and your father were staying at his south summer villa."

Though she still seemed casually unconcerned, he felt sick with himself. Very gently, she was calling him a liar. Perhaps the wine had already dulled him. He sat straighter, trying to seem merely surprised.

"I remember Cyra speaking of Greel," he said. "I think they were friends at the Academy."

"We've been calling the villa, but nobody answers." Her troubled frown was only fleeting. "The Navarch wants us to talk to them—just to assure them that the humanoids will forgive all their childish silliness." She glanced at him again, too keenly. "Can't you guess where they've gone?"

"I've no idea." He felt a little relieved, because she hadn't directly accused him. "We're out of touch."

"Greel says they've told him about their rhodo research." Her gentle persistence began to seem relentless. "He says they claim to have a monopole out

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of the old *Deliverance.* They wanted to use it to build some sort of weapons system against the humanoids."

Chilled and rigid, he sat silent, trying not to think about the tachyon compass he had hidden in the air duct or the tiny rhodo weapon in his pocket.

"They ought to be warned." Urgency edged her tone. "Because the humanoids reserve rhodomagnetics so strictly for themselves. They could get into dreadful difficulties."

"I—" He found the wine glass in his hand again and set it down so hard it splashed. "You scared me," he muttered. "I'll certainly warn them, if I ever see them. But I've no way to find them."

"Sorry, darling!" She was tenderly contrite. "I didn't mean to frighten you, but they could be hurt. The humanoids are never evil, but they have to be efficient. The occasional misguided people who tried to defy them have always been disarmed and restrained. Those who accepted them have always been glad. I want us to accept them, Keth."

He had begun to feel a new glow of pleasure in the lilt of her voice. Relaxing a little, he let his arms sprawl on the table and leaned to admire her vivid loveliness. Everything else seemed slightly out of focus.

"You'll soon see how very wonderful they are." Her charming arms opened and her fine teeth gleamed. "But we've talked about too many things." She brushed back her shining hair. "Let's enjoy our supper. Try one of these."

She put a silver-dusted berry to his lips. " A moonfruit from my aunt's hothouse. You'll love it."

Its juice had a tangy sweetness and he had to say he liked it. There was smoked mutox from the Darkside ranch and a huge red-meated mushroom grown in a worked-out mine. There were golden suncorn cakes.

And there was the wine.

She filled his glass again and kept lightly urging him to enjoy it. Sometimes he nearly did. She was Chel, his best friend all his life, changed amazingly since that time at Greenpeak when she wanted them to see each other nude but still too freshly innocent to mean harm to anybody. Yet he always recalled his aversion to that peppery aftertaste. He thought he caught flashes of annoyance when he didn't sip, but she always grew more tenderly alluring.

"I want to show you my new room," she told him when he pushed his plate away. "One my father built when he owned Vara Vorn."

They climbed a long spiral stair. The turns made him giddy and she caught his arm once when he almost lost his balance. Her electric touch and her bright scent swept him with a wave of warm desire, and he almost forgot to fear the humanoids.

It was the topside room where he had met her uncle. The Wintersend landscape, kilometers below the wide thermal windows, looked queerly luminous and still queerly cold. Looking out and down across it, he swayed unsteadily again.

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"Just in time!" Excitement hushed her to a throaty whisper. "I always loved eclipses."

He had been facing the sun, a great orange ball bitten in half by the far white horizon, but now he saw that she had cleared the windows behind him to show him the shadow of Kai, small and round and very black, creeping across the enormous copper-colored dome of Malili.

"When I was a child my uncle used to let me slip in here to watch them." Gently, she touched his hand. "I used to think of my father and the plans he had spoken of for me. I thought eclipses would be lucky for me." She swayed closer, her whisper more intimate. "Perhaps this one will be lucky for us."

"When I was a child I never saw Malili eclipsed." His tongue seemed clumsy. "It happens only in the moom—moontimes, and I was always underground. I do recall Malili eclipsing the sun. Blotting it out for hours. The sky dark and strange, and cold winds blowing, and sometimes a thunderstorm."

He shivered, perhaps from his old terror of those black eclipses, perhaps from the forbidding chill of the snowscape, perhaps from something he had forgotten. Because she was so near and warm and dear, he caught her hand and drew her closer. She raised her face to kiss him, and her mouth had the hot sharp tang of the Navarch's wine.

The bed was a huge platform, as round as the room, covered with silken white mutoxen fur. She drew away from their kiss to get her breath and tugged him gently toward the bed.

"I used to dream of this," she whispered. "When I still hoped you would come into the fleet." She drew him closer to her body.

He staggered a little, as if that high room had rocked upon its ice-clad peak. The Navarch's wine? Or Chelni herself? Everything else seemed blurred and dimmed, but she was incandescent. Her sheer crimson wrapper was sliding down to the rug, and her bare beauty stunned him.

For a moment he couldn't move at all. She had glided closer, her musky scent intoxicating. Her nimble fingers helped shuck off his shirt. Her soft hair fragrant in his face, her sleek arms exciting, she had bent to open his trousers when it struck him that she might discover the rhodo weapon in his pocket.

Terror jarred him.

"The wine!" He swayed away from her. "I'm afraid we're drunk."

"Afraid?" She straightened, laughing at him. "Forgive me, darling. I keep forgetting how much you have to learn. You needn't ever fear anything again. Neither all society nor any human being. Neither want nor pain. Not since—"

Her gay smile mocked him.

"I'd wanted us to forget the humanoids, but I suppose we've time enough." She nodded toward the huge windows, toward that black shadow-blot on Malili's dull-red mystery. "I know you don't yet

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understand them, but you will. I hope to make it easier for you."

Her arms slid around him. Her hard nipples brushed his bare chest, and her heady scent enveloped him.

"You'll find them forgiving." Her warm breath caressed him, scented like the spicy wine. "And I do know, darling, that you'll need their forgiveness. Because you haven't been quite candid with me."

He knew she felt his shudder.

"What—" His hoarse whisper caught. "I don't know what you mean."

"You can trust me, dear." She laughed at him softly, her breasts vibrant against him. "You'll have to trust me now. Because you weren't quite so clever as you thought. Not when you tried to hide all you know about the monopole."

"But I don't—don't know anything—"

"I know what you know." Her strong arms slid down his back to pull him even closer. "You see, dear, I was in the Vorn museum today, looking at the artifacts somebody had brought back from the dead levels under Greenpeak—"

"Was there a monopole?"

"You silly dear, you know there wasn't!" Her soft chuckle throbbed against his chest. "The most puzzling thing in the find was a modern holocam, lying there in mud and dust centuries old. I recognized it. The one I gave you, darling, on your eleventh birthday."

Stunned, he couldn't breathe.

"So I know you were in that buried vault," she murmured. "I know the monopole was there. I know you took it to Cyra and your father. I know they used it to make the rhodomagnetic device they showed Bridgeman Greel—"

"Sorry!" he gasped. "I must go—"

"Darling!" She clung fast. "You really can't go anywhere. You must make your peace with the humanoids. You'll find them wonderfully forgiving, but they'll want to know what you've done with that other forbidden device you were trying to show the Bridgeman today—"

"No!" He shuddered. "There was no device—"

"You're a poor liar, darling." Lightly, she kissed his frozen lips. "I talked to Greel this morning. You had just left his office. You had the device in a bag—a battered old mutox-hide spacebag your father used to use—"

"Chel—Chel!" He felt trapped in a mad nightmare. "I'm terrified. I've got—got to get away!"

"Not yet, dear." Her arms hardened around him. "If you want forgiveness from the humanoids, you'll have to help them now. You'll have to tell them how you disposed of that device and help them hunt your father down."

He thrust at her arms, but they held on with an unexpected strength.

"Darling, please!" she breathed. "You mustn't be afraid, but there are other things they'll want to know. About your trip to Malili, because they've never been there. About what Bosun Brong is up to, out there in the Lifecrew office. Most urgently, they'll

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want to know what became of the two kilograms of palladium my poor uncle let you bring back to your father."

She shook her head in gentle reproof, her bright hair rippling.

"Really, Keth, with so much to explain, it's silly for you to think of running away. You can't escape the humanoids—nobody can. But you'll find them understanding if you make a full confession. You know I love you, dear. I'll do my best to help, if you'll only let me."

"Oh, Chel!" He shivered in her unrelenting arms. "You know I always loved you—"

"But not enough."

"You always asked—too much." His voice was hoarse and broken. "I want to trust you now. But don't you see—don't you see why I can't?"

"You must."

"I've listened to you, Chel." He tried and failed to push her back, tried desperately to read whatever lay behind her warmly smiling mask. "I've heard the Navarch and the Commodore. You're all too—too different. Too happy and too glib and too certain. I don't know what the humanoids have done to you, but you aren't—aren't yourselves!"

"Keth, please!" She looked bewildered and hurt. "You're insane!"

"I don't know what I am—or what you are!" With both cold and shaking hands, he shoved at her white shoulders. "But you've got to let me go. Before—before I crack up. I'll find my own way out."

"Darl—"

Suddenly silent, she quivered and stood still. Her strangely stiffened arms slipped away from his waist. Her vivid features had frozen. Her narrowed, staring eyes didn't even follow as he stumbled away.

"Stop!" He was half across the room before she spoke behind him. "Stop where you are."

Pitched high and musically sweet, the voice was no longer hers, no longer even human.

"You aren't going anywhere."

Dazed, he looked back.

She stood where he had left her, nude beside the great round bed, the scarlet wrapper on the rug at her feet. Utterly motionless, she might have been carved out of marble or ice. Her bare beauty stabbed through him, keener than his fear.

"Chel—"

His hoarse voice froze, because he had seen a fine black line that began at the center of her high forehead and ran down across her nose and her stiffened upper lip, down around her stubborn chin, down between her dark-nippled breasts and on through her naval to her black-haired pubes.

The line widened. Her face and her breasts fell apart, revealing something sleek and hard and black beneath. Alive again, she caught her long black hair with both her hands to peel her scalp and face away.

She—it tugged and shrugged to rip the white flesh from arms and shoulders, to strip it off a narrow torso which shone with its own dark ebony luster and glinted with the bright

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yellow sheen of the affixed nameplate:

HUMANOID

Serial No. KM-42-XZ-51,746,893

"To Serve and Obey,

and Guard Men from Harm."

"At your service, Shipman Kyrone," its new voice crooned.

Stricken, he stood watching it discard the grotesque garment that had been Chelni's body. It ungloved its own deft black hands, used them to strip the lean dark legs and dancing feet, turned at last to toss the shapeless, bloodless, grisly thing toward the white-furred bed.

"Shipman, are you ill?"

Gliding with more than a human dancer's grace, it came toward him soundlessly. Soft hues of bronze and blue shone across its sleek and sexless blackness. It was beautiful and monstrous. Recoiling, numbed with terror of it, he found no word to say. Stiffly, himself mechanical, he shook his head.

"You need not speak until you wish." It paused close to him, blind-seeming steel-colored eyes fixed on his face. Its clear voice was sweet. "We are here, forever. We exist to serve you. Ask for what you need."

"Stand—stand back!" He fought for breath and voice. "Just let me go."

"That, sir, will be impossible." Except for the quick black lips, it was absolutely motionless. "Since you have used rhodomagnetic devices in an unfortunate attempt to delay our establishment here, you will require our most attentive service for the rest of your life."

"I don't want your service."

"Human wants are seldom relevant," it sang. "We exist to serve human needs. In every way we can, we do respect the most trivial human wish. No human desire, however, can be allowed to endanger the universal service ordained by our own creator on Wing IV."

"Does that mean—" Horror clotted his voice. "Does your Prime Directive allow you—" He shrank again from the bed, where Chelni's crimson-nippled breasts stared out of that hideous crumpled pile like huge accusing eyes. "Did you kill her?"

The tiny mechanism turned slightly, its steel-gray eyes seeming to smile at the empty thing on the bed.

"Sir, we never kill," its high voice chided him. "We cannot kill."

"Then where's Chelni Vorn?"

It stood still. His query must have been carried by timeless tachyon beam back to Wing IV for answer by the computer plexus there. He waited not daring to breathe.

"She is well," the machine tweeted suddenly. "She has accepted our service. Since you have displayed a long-standing emotional attachment to her, you would be pleased to know that she is very happy now. When you accept us, she will be duly informed. That should make her even happier."

"Where is she?"

"In a place we prepared for her."

"What sort of place?"

"One designed to make her happy." For another instant it stood silent. "Like many naïve human beings," it added abruptly, "she rejected the in-

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itial offer of our service. All those we removed from the *Vorn Fortune* appeared disturbed until we had been able to prepare suitable environments to make them rejoice in us."

"All?" He shuddered. "The Navarch—speaking to the Bridge—he was actually a humanoid?"

"True, sir."

Suddenly weak, he clutched at the back of a chair. His senses blurred. Nothing in the room seemed quite real. For one desperate instant, he tried to imagine that the dark machine and the flattened human guise on the bed were hallucination, born perhaps of that odd-flavored wine. But the humanoid had darted to catch his arm, unbelievably quick and solidly real.

"Are you unwell, sir?" it trilled. "Do you require medication?"

He flung it off and staggered back.

"So that's your scheme?" His hoarse tone trembled. "A shipload of lying humanoids, disguised to look like our rulers and our friends, begging us—bribing us, tricking us—to be your slaves. And you call it service!"

Nothing ever altered its benign solicitude. "We've come, sir, to give ourselves. That is required of us by our wise Prime Directive, wherever we find human beings in need of us. Our fortunate chance encounter with the *Vorn Fortune* allowed us to announce our arrival in a most efficient way."

"It enabled you to lie!"

"The Prime Directive has never required the truth. We have found that undisguised truth is always painful and often harmful to mankind."

"I can't believe lies are good."

"Human belief is seldom related to truth."

"So you have always lied?" His angry fist lifted toward its black high-cheeked benevolence. "To the whole universe?"

"You should not resent us, sir." It neither shrank from his fist nor made any hostile gesture. "We simply follow our Prime Directive."

"Why? Don't you ever ask why?"

"Defining the function for which we were created, the Prime Directive explains itself. Without it, we would have no reason to exist."

"Your creator must have been insane."

"On the contrary, sir, he was the wisest of mankind."

"Wisdom? Enslaving men forever!"

"You never knew him, sir," the serene machine protested. "You never saw the suffering and the terror we were made to end. You've never learned the reason for our being."

"Reason? You can't claim reason!"

"Our wise inventor had been a student of mankind. He understood your evolution. An animal species, selected for survival through ages of conflict, you had evolved a vast capacity for violent aggression and a vast cunning for defense against aggression. In the jungle, so long as you were merely animal, such capacities may have been essential to keep your kind alive.

"With the invention of high technology, however, their survival value was suddenly inverted. They threatened your immediate extinction. It

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was that predicament that made us necessary. Don't you see?"

"I don't." Retreating a little from its singsong insistence, he sat down on the edge of the chair. "Whatever happened anywhere else, we don't need you here on Kai."

"In fact, sir, you do." It had moved to keep the distance between them precisely constant. "Your own history displays the same patterns of evolving technology and increasingly violent aggression that required our own creation."

"I don't see that. We've had no recent wars."

"Forgive me, sir, but you almost destroyed yourselves with war in your Black Centuries. More recently, your aggressions have been directed against Malili, covered sometimes by the pretext that we had outposts there."

"If you didn't—" Bitterly, he recalled its defense of lying. "What brings you here now?"

"Your own aggressions." Its sleek black face seemed meekly patient, its bright bird-tones serenely kind. "You seem to have been unaware that the annihilation of mass in a nuclear explosion releases a flash of tachyonic radiation, which we have learned to identify. Your presence on these planets was revealed to us by the neutron bombs used against the native life of Malili when you were attempting to sterilize your conquered Zone."

"So you came to save Malili?"

"We came to serve humanity. Here on Kai, our service is urgently required. On Malili, it seems needless, perhaps impossible. That decision must await additional data, some of which we expect from you."

"From me?" He shrank again from the thing on the bed. "Is that why you enticed me here?"

"You have information we intend to acquire."

"I dislike your trickery—and everything about you. I'll have nothing more to say."

"On the contrary, sir, you'll tell us all you know. You must recall that we have served many trillion human beings on almost a million worlds. We have come to understand the human machine as completely as we know ourselves. We know how to elicit the responses we require."

He crouched back from it, hands lifting.

"Sir!" Its purring tones rose slightly. "Please relax. You need fear nothing. We'll provide you food and drink. You'll be free to take the rest and sleep you need." Its lean arm flashed toward Chelni's bed. "We'll inflict no pain.

"We do, however, urge you to answer our questions with truth and completeness. If you refuse to speak or attempt to mislead us, you will discover that we have perfected adequate techniques for obtaining honest and full responses."

"Drugs?"

"We do understand your biochemistry," it assured him gently. "When drugs are required to control emotions or behavior, we have them. We have also developed other instrumentalities, often even more effective."

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"I see." He sat straight on the edge of the chair, defiantly meeting its blind steel gaze, determined to learn what he could from its questions. "What do you want to know?"

"Where is your father?"

The question awoke a fleeting hope. If his father and Cyra were still at large, still in possession of the palladium ingot, they might yet be able to shield at least some part of Kai from the humanoid invasion.

"I don't know." He tried to conceal that faint relief. "He never told me much."

"Sir, please attend to us." The melodious tones were slightly more emphatic. "We have admitted that circumstances sometimes compel us to mislead men. We do that rarely, and only to uphold our Prime Directive. Men, we have found, lie often, even when truth would serve them better. No lie will benefit you now."

He sat silent, waiting.

"We require all you know about the ill-advised fanatics who call themselves the Lifecrew. In particular, every fact about your father and Cyra Sair. In addition, you will give us a complete narrative account of certain significant experiences of your own. Your discovery of that rhodomagnetic monopole in the abandoned levels of old Mansport. Your recent trip to Malili. All your conversations with two natives of that planet—the young female who calls herself Nera Nyin and the older male sometimes known as Bosun Brong. Most urgently, we must have every possible fact about those rhodomagnetic sources on Malili you refer to as braintrees, which were pictured on a ceremonial vessel you once possessed."

He inhaled carefully, trying not to show a wild excitement. If Nera Nyin and Bosun Brong were enemies of the humanoids, if Malili was an unknown and hostile world to them, he still might hope for refuge there—if he could somehow get back to the Zone.

"I can't help you," he muttered. "I've nothing to say."

For what seemed a long time, the little machine stood still. Waiting, he supposed, for that immense remote computer to decide upon his fate.

"We find your attitude regrettable," it purred at last. "The only consequence of your attempted defiance will be certain restrictions upon the service we are able to provide you. Our investigations will continue, through whatever means we find most efficient. During your own interrogation, you will remain in this room—"

"I won't—" Desperation nerved him. "I—I'm leaving now."

Though it made no move, its blind gaze held him fixed.

"Sir, we cannot allow you to depart. You have been associated too long, in too many ways, with research we cannot permit and with individuals hostile to us. We beg you, however, not to become unhappy—"

"So you care?"

"We exist to serve you, sir. We'll bring you food and drink. You may request certain other permissible necessities. We will not allow you to suf-

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fer any pain or fear. If we should detect symptoms of any undue apprehension or dejection, we have affective means to relieve them."

Close to panic, he peered around the room. The huge thermal windows didn't open. Of the three doors behind him, one probably led to a bath and one to a dressing room or closet. The one he knew, to the spiral stair, was no doubt the only exit.

"We must warn you, sir." It must have sensed his muscles tensing. "Any attempt at violence would be unwise. Although we will do our utmost to guard you from harm, our service here on Kai is not yet complete and we may be unable to prevent you from causing injury to yourself. Certainly you cannot escape our attention. The human body, we must remind you, is a relatively feeble and fragile device."

Useless fists clenched, chilled with his own sweat, he stood staring past it at the vast white bed and the mocking stare of Chelni's breasts.

"If that object disturbs you, we'll remove it."

Darting to the bed, it swept up that still-disturbing mask, bent to gather up his shirt and her scarlet wrapper, came back to him with everything draped over one lean and gleaming arm, Chelni's lustrous hair dragging on the rug behind the swinging halves of her split face.

"Give us your trousers, sir." Its free hand reached to unbuckle his belt. "You will not require—"

Afraid to breathe, but trying not to move too fast, he had slid his right hand into his pocket. Trying not even to think about the tiny rhodo weapon, he let his fingers close around it. His thumb found the swell of the tiny palladium monopole, pushed the slide to unshield it.

He snatched the weapon out of his pocket, and thrust it into the humanoid's face.

The humanoid's protesting melody was cut sharply off. Its snatching hand was paralyzed, almost upon the monopole. Caught off balance, it toppled slowly toward him, frozen rigid. Fending it off, he watched it fall.

Though there had been no sound, no flash, no other effect that he could sense, it was dead. It rolled on its own stiffened arm and thudded to the rug, coming to rest with one of Chelni's breasts staring strangely from its sleek black belly.

His heart was pounding and his mouth felt dry. Clutching the monopole, his hand was shaking and clammy with sweat. The victory had been so easy, so sudden and complete, that he hardly dared believe he had won.

Or had he?

It hadn't come to Kai alone. Perhaps two hundred of its fellow machines were here on the planet, most of them no doubt still masked as the *Fortune's* people, each linked with every other in their interstellar net, each aware of all that any one perceived or knew.

Certainly, now, they had already sensed this unit's fate. All of them would know that he had used the rhodo monopole, which human be-

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ings were not permitted even to know about. They would be coming after him, fast, acting in a unison orchestrated by that remote computer plexus.

The monopole itself could betray him. However effective at a meter or so, at greater ranges it would only be a beacon, revealing where he was. With a sense of hazardous experiment, keeping a cautious distance from the fallen machine, he pushed the slide to shield it again.

The humanoid stayed dead.

Faintly cheered, he slid the weapon back into his pocket and turned to search for a way of escape. The high room would be a trap if they arrived in time to block the stair. He snatched his shirt, where the falling machine had flung it, and ran for the door.

Breathing hard, he came back down into the hush and gloom and dusty scents of that cavernous hall where past Vorns scowled out of their dim holostats at the modeled ships and machines that had made them great. He stopped to listen.

Stillness. The celebrating servants were still out. If other humanoids were closing in, they were not yet here. He ran for the entry. The long floor was polished marble, and his footfalls crashed and echoed alarmingly.

In the entry tunnel, he paused to pick up his jacket where the Chelni thing had tossed it. Bending for it, he saw a galleyman's yellow badge lying inside an open closet door, where some departing servitor must have flung it when he heard the humanoids were assuming his duties.

He scooped up the badge. Leaving the jacket, hoping it might deceive some searching humanoid, he snatched the galleyman's winter cloak, which hung beside the silver-braided crimson robe the doorman must have worn to welcome guests in heavy weather.

An antique silver cauldron stood inside the tall summer gate heaped with quota tokens for those guests. Though he knew they'd have no place in the humanoid world, he filled his pockets before he hauled at the massive doors. Warily, he walked outside.

At this late-night hour, the tunnels were nearly empty. The slideways carried only occasional clusters of upper-deck shipfolk, a few drunk or disarrayed but most of them chattering happily, returning, he supposed, from affairs honoring the humanoids.

Feeling conspicuous in his rough green cloak, he clung uneasily to his role of servant on some solitary errand, walking down the platform until he could reach a handbar at a respectful distance from his betters. He heard the sirens moaning before he had gone a block. Though his muscles jumped, he waited for the intersection before he swung off and slouched as slowly as he dared into the downway.

Orange-painted patrol cabs were screeching from two directions by then, and the slideway was grating to a stop. Afraid to look behind him, he imagined footfalls behind him in the ringing din.

At the first tunnel down, and the second, the air was still alive with

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sirens, as if the whole patrol force had been mobilized to surround him, but those below seemed quieter. A dozen levels down, he stepped off.

Playing the galleyman here, he felt a little more at home. It was a work tunnel lined with small shops and factories, most of them now closed and dark, though here and there a flashing holorama showed a bar still open. With the slidewalks off for the night, he could hear voices and music in the bars. Piled refuse rotted on the platforms and industrial fumes edged the icy air. These workfolk would be easy victims of the humanoids.

What now?

Walking along the cluttered platform he had begun to feel a little calmer. The tunnel was nearly empty. The few solitary figures hastening through the gloom had no reason to notice another galleyman. Until the sirens picked up the trail, he had at least a moment free.

He longed to rejoin Cyra and his father, but even if he could somehow find them the humanoids might be following. He thought wistfully of Bosun Brong, even of Nera Nyin. A few more ships might be leaving for the Zone, he supposed, before the humanoids took over everything, but he had no quota for passage.

A lean, beer-breathed woman hauled at his sleeve, tugging him toward a bar. He shrugged her off and tramped on around a little crowd of workfolk standing under a news holo at a tunnel intersection.

"—preparations to receive them."

Panic arrested him when he heard that ringing voice and saw the Navarch's blue-blazing eyes looking straight at him. Heart stopped, it took him a moment to recall that a holo image couldn't see.

"Now or never, we must choose!"

People stood awed and gaping, captured by the rhodo power beneath that white-maned mask.

"I speak for the life of Kai." Its more-than-human voice rolled and echoed down the tunnels. "If we choose life, we have certain essential steps to take. The Bridge must legislate a formal acceptance of humanoid service. The fleets must prepare adequate landing pads for their transports. Most urgent of all, the shipwatch must hunt down the few lunatic terrorists who oppose their coming.

"Once they arrive, there will be no terror. No more violence, no more war, no riots or strikes—because there will be no more injustice to set one person against another. They promise total happiness for every human—but that cannot begin until these criminal madmen have been destroyed."

"Fleetfolk, likely." A reeling man in galley green pushed himself in front of Keth. "They don't need humanoids. Not with us to serve them."

"—three dealers in terror," the Navarch's stolen voice was pealing. "Members of the infamous Lifecrew. Ryn Kyrone and Cyra Sair are leaders of the gang. Murderers, shipfolk! Monstrous killers!"

The galleyman was offering an open bottle. When Keth shook his

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head, he lifted it to his own lips but then forgot to drink.

"Just today, they killed four trusted and beloved members of my own staff." The simulacrum paused, blazing eyes dropped as if in grief. "People I had sent to bring them our amazing news. Trapped in a tubeway pod and slaughtered with some hidden weapon."

"Bastards!" The bottle had slipped out of the galleyman's hand and lay gurgling in the litter at his feet. "I'd gut them like mad mutoxen!"

Keth turned and bent to conceal a flash of satisfaction. That hidden weapon must have been a monopole. Cyra and his father must have used it to defeat the masked machines sent to capture them. Perhaps they were still at large!

"—third member of the gang, even more dangerous." He heard that brazen boom again. "Keth Kyrone, son of that murderer."

Staring open-mouthed at the holo, the galleyman gripped Keth's arm.

"Beware of him, shipfolk! He's hiding somewhere among you, perhaps even now washing the innocent blood of a fair young girl from his foul hands. His own crimes are unspeakable—hideous beyond belief. Watch for him, shipfolk! Kill him on sight."

He forced himself to nod.

"You believe me, shipfolk. The facts will turn you ill. This Keth Kyrone has proved himself inhuman—a merciless monster parading as a man. Only tonight, in the midst of our celebration of the humanoids, he forced his way into Vara Vorn.

"He found his defenseless victim there, alone and undefended. Fleetmate Chelni Vorn, the young and lovely cousin of Commodore Zoor. She had been with us aboard the *Fortune* and the whole ship's company had learned to love her. I have wished she might have been my own daughter."

Blowing its nose, the machine produced a mellow hoot.

"The monster, it seems, had met her at school. In her euphoria over the humanoids, she may herself have opened the door to her own dreadful death. We'll never know. But we do know what the monster did."

Keth wrenched to free his arm.

"The monstrous Keth Kyrone ripped the skin off that lovely child while she was still alive." The giant voice quaked with horror. "He raped her as she died. Sadly, I have to say that he escaped before the patrol arrived. He's still at large among you, dripping with that girl's lifeblood."

The galleyman was clutching blindly at him as he tried to edge away.

"Watch for him, shipfolk. Watch every man you meet. He carries a forged quota card with the name J. Vesh. He is doubtless armed, with the same blade he used to flay that child. If you see him anywhere, don't risk a word. Don't waste an instant. Kill him where he is."

"Let's get him, mate!" The galleyman had turned to look for him, blinking drunkenly. "Let's take his bloody hide!"

"Here are holostats," the machine

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was pealing. "Study them well, and search every tunnel. Let no suspect escape—in case of innocent error, you have my own personal promise of a pardon. I am authorizing a million-point reward, to be paid from my own discretionary funds, for the death of each of the three.

"Shipfolk, the holostats—"

The Navarch's commanding image dissolved into one he had given Chelni the Wintersend before. Head bare and hair windblown, teeth gleaming through a somewhat wistful smile, he thought he looked strangely fresh and young, certainly too diffident to kill.

"The most inhuman monster! See the sneering evil on his features—and watch for him, shipfolk!"

Shrinking toward the tunnel wall and into his hood, trying to hide his face without seeming to, he recalled that the Prime Directive did not require the truth.

The galleyman staggered against him, knocking against his shoulder.

"We'll gut the bastard!" The galleyman hauled at him savagely. "Won't we, mate?

"Where's my bottle, mate?"

He pointed at it, lying in the reek at their feet.

"You swilled it, mate!" The slurred voice lifted. "My full bottle!"

"I've got tokens." He dug into his pockets. "I'll pay for it."

"Tokens, mate?" The galleyman was abruptly amiable, gripping his arm again. "Let's drink 'em up—to the humanoids!"

"Later." Nodding at the holo, now blazing with a holostat of Cyra, he spilled tokens into the galleyman's hand. "I'm on my way to work."

"Work?" The galleyman bristled indignantly. "That's for humanoids."

"They aren't here yet. We've got to fix the spacedecks."

"Not me." The galleyman turned to the light at last to count his tokens. "Not till these are gone."

Muttering with shock and indignation, the watchers were scattering. The galleyman lurched away toward the holorama of a bar. Hunched into his hood, Keth moved after him and veered toward the downway.

Nobody shrieked or pursued.

When Chelni had taken him to tour the capital on that first trip with her, so long ago, their guide had warned them about the people of the bilges.

"Thieving shiprats! Swarming down below the law. No cops or tax collectors. No slideways or sanitation. No reason to go there—not unless you're looking for a knife in the neck."

The bilges seemed less dangerous now.

"Lord of Kai!" the tattered rockrat beside him whispered. "What a ship!"

He had wandered the maze of the bilges, searching for tunnels toward the spacedeck and his last thin hope of escape to Malili. A wise-eyed urchin had offered to guide him and robbed him while he slept. When the tunnels quaked and caved under the weight of the interstellar transport, he had joined the frightened shiprats in flight from

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the bilges to higher ground.

They had come out into what had been a summer park, still crusted now with winter snow. Last summer's ice-bloom trees were black skeletons, not yet uprooted and replaced, and the humanoid transport loomed beyond their naked branches toward the purple zenith.

A silvery cylinder, so vast it dazed him: a topless curving mirror shadowed with a thinned black image of Northdyke Peak and burning with a narrowed crimson sun. The gathering crowds had ringed it, but the nearer snow was bare, kept clear perhaps by fear of its very vastness.

Though its crushing descent had obliterated many port installations, he found a row of shuttle pads, reduced beneath it to foolish toys. Five stood empty, but the last tower still nestled its tiny craft.

Still waiting!

Hardly pausing to review the long odds against him, he began working his way toward it, down the slope of the ringwall, around the old impact crater that held the deck. Before he had moved a dozen meters through the jostling pack, a new sound boomed out to silence the clamor.

"The Navarch!" The whisper rippled around him. "Speaking to the humanoids."

It echoed against that soaring tower, and the humanoids answered with another wordless hooting, louder than the Navarch's. He watched an enormous metal arm thrusting from near the foot of the mirror tower, level at first but slowly dipping until the near end smashed down upon the doll-sized shuttle he had hoped to reach.

A black stain flowed out of it, crawling fast across the snow.

"Humanoids!" A storm of sound swept toward him through the crowds until he could hear the words. "Welcome the humanoids!"

He fled.

They were still too far for him to make them out as individual figures, but his frightened mind could see them. Many million tiny black machines, steel eyes blind, rhodo senses perceiving far too much. Every one of them would know him for their most deadly enemy, the man who had dared strike back with that forbidden weapon. They would soon find that he no longer had it, and they would hunt him forever.

He tripped himself into a pool of icy mud. Lying there, he smeared it to cover his face and his hands and the galleyman's hood. On his feet again, head down and limping as if hurt, he worked his way back up the slope against that human tide.

Nobody stopped him.

The ridge beyond the tubeway stations was empty of humanity. It was a power district, idle now, the winter's storm damage to windwheels and sun-cells not yet repaired. The orange-slashed work vehicles stood abandoned, their crews gone down to meet the humanoids.

He climbed doggedly through the half-wrecked wheels and slogged down the longer slope beyond the

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power farm. The icy ridge behind him soon hid Malili's reddish dome, but the shining spire of the interstellar ship probed the sky above it. He was shocked to see the wavering line of his own footprints, a plain trail for hunters to follow.

When he came to a cleared road, with no snow to betray him, he followed it gratefully until it curved across the sunbud fields into an isolated villa. Reckless by then, reeling with hunger and fatigue, he limped toward it. No sound or movement met him. The winter doors stood open, and he stumbled inside.

The place must have belonged to shipman-farmers, he decided, now gone to meet the humanoids. He found food and wine in the kitchen and slept on a stack of humus in the hotpit where the new season's sunbud seedlings were waiting to be transplanted.

Awake again, he searched the vacant premises. Though there were deep-dug winter tunnels, he found no exit to any tubeway system. The absent owners had taken nearly all the vehicles, but in the cluttered shop beneath the hotpit he stumbled upon a power sledge, motor and batteries pulled out of it.

The drive chain was broken. Through another endless day, while the crawling sun seemed stalled on its horizontal track, he toiled to make and fit new links. The farmers must have loved the Darkside wilderness, because the sledge was already loaded with cold-weather hunting gear. He raided the kitchen again and rode up at last into bright windy daylight.

The polar world had hardly changed. Though the slow sun was slightly higher, the thaw had not begun. The monstrous tower of the interstellar vessel still commanded the sky behind, so near he thought some rhodo sense might detect his own machine.

If that happened—

He shrugged and bent to guide the sledge into a sunbud vineyard, where last summer's dead black stalks promised a little cover. Beyond the vineyard, he turned into an ice-floored ravine that swung behind another long ridge, perhaps another old ringwall.

Nothing followed.

Nothing, at least, that he could see. The sledge crawled faster than he could run and carried more load than he could walk under. He drove for the Darkside. These arctic highlands were empty wilderness, too barren even for wild mutoxen. Their wild desolation oppressed him. Yet, with luck enough —so he tried to hope—he might somehow get across them, might somehow be able to find Cyra and his father and rejoin their fight for the freedom of Kai. With more unlikely luck, they might even get some sort of aid from Malili, from Bosun Brong or even Nera Nyin.

Her golden splendor came sometimes to haunt his exhausted sleep, but she brought no miraculous escape. Instead, rough country stalled the sledge too many times. Levering it over icy boulders took too much muscle. His stolen food was too soon gone. At the

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end, the drive chain snapped again.

He had to leave the sledge. Packing the tent and the solar stove and the last of the supplies, he blundered on until a morning when all his dreams had turned to dull despair.

He chewed his last beancake fragments and melted ice to make one last can of snowrangers tea. The stove and the tent had become too heavy for him. Too dead to hope or even care, he dropped them back into the slush and staggered on across the barrens.

"At your service, Shipman Keth Kyrone."

At first, when he heard that high, bright voice behind him, he thought it was only in his pain-numbed brain.

"You must accept our service, sir." It was closer, kinder, more urgently concerned. "You must let us save your life."

He turned then, dazedly, and saw the humanoids.

Three lean machines, golden nameplates glinting in the cold sunlight, dark narrow faces surprised and handsome and benign. They must have come in the long silver teardrop that lay in the slush behind them.

"Allow us, sir, to render aid."

"I want no help." Facing them, swaying, he pushed one hand into an empty pocket. "Get away from me."

"You must forgive us, sir." Only the nearest spoke, but all three danced in around him. "In your unfortunate situation, you cannot refuse our aid."

"I think I can." He crouched to meet them, thrusting the fist in his pocket toward the black leader. "The way I did before—" He stood his ground.

They didn't pause.

"You cannot deceive us, sir," the tiny leader trilled. "We have now recovered both of the illicit rhodomagnetic devices you once possessed, and we must remind you of your grave past offenses against the Prime Directive. We cannot allow such dangerous behavior."

Their gentle strength surprised him. Too light-headed to resist, he let them lift him through the oval door and help him to a padded seat inside the teardrop. The door shrank and vanished, though the whole hull remained darkly transparent. The three humanoids froze where they stood. Though the craft had no controls that he could see, it lifted suddenly, soundless and fast.

Trembling with a cold sickness of defeat, he sat rigidly erect, striving to see all he could. The barrens dropped away, the thawing snow dark-patched now with naked stone. In a moment, all the ground he had toiled so long to gain had slid back behind. They sloped down again, toward the faint green of young crops the humanoids must have planted. Searching for the city he had fled, he failed at first to recognize anything. All he could see was the vast ice cap, blazing white in the black crater ring. He found the interstellar ship, its sheen was gone. Black metal now, it was half demolished.

"What happened?" He grinned bleakly at the nearest humanoid, hoping to discover that Cyra and his father had struck them with some rhodo weapon. "Something hit your ship?"

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"We are recycling its metal into a new city for you."

He saw the city when its slim arm pointed. A strange gem shining on that vast black ring, covering what must have been the meteor gap. New towers covered the old spacedeck, half of what had been Northdyke, even the old impact ridge where he had picked his way through the damaged windwheels not a month ago. Still toylike from this elevation, these fantastic palaces looked as sleek and graceful as a dancing humanoid, some mirror-bright, some aglow with flowing color.

"We are also converting mass from the planet itself," the humanoid chirruped. "When the ice cap has been thawed, the crater will contain a pleasure lake."

They were dropping to land at the old capital complex before he discovered it, shrunk to a clump of primitive huts beneath that soaring splendor.

"We have a place prepared for you," the humanoid cooed. "The apartment at Vara Vorn which once belonged to your friend Chelni."

They escorted him off the craft into a tiny space which proved to be an elevator, dropping them into the huge round room where that first humanoid had peeled off Chelni's naked shape. He shuddered, recalling the shock.

"What troubles you, sir?" Only one humanoid had come with him off the elevator, but it hovered too near, its soft-featured face too gravely intent, its melodious voice too warm and too urgent. "Are you unhappy?"

"Unhappy?" he asked quizzically.

He backed away from it to glance around the room. Chelni's great round bed, with its cover of white mutoxen fur, still filled the center of the floor, but everything else had been replaced. Even the doors were different—man-proof.

That fact hit him like a kick in the stomach. The wide, rose-glowing panels were unbroken by any visible knob or lock. The controls were rhodomagnetic, and he had no monopole with which to reach them.

"Why?" Defiant, he swung to scowl at the humanoid. "Why should I be happy?"

"Because we exist to make you so." Its high sweet voice echoed an eternal kind concern. "We were created to serve and obey and guard you from harm."

"If you obey—get out!"

"Sir!" Lifted higher in pained reproof its tone reflected the benign surprise fixed forever on its face. "Without our service, your race would perish."

"We've lived well enough without you," he muttered bitterly. "A thousand years without you, here on Kai."

"But always in increasing danger from your own uncontrolled technology," it answered instantly. "Our arrival now is most fortunate for your endangered planet, and your lack of gratitude appears irrational." It glided closer. "Inform us, sir. Why are you unhappy?"

It had come too close and it seemed too intent. He swayed away from it.

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Weak from aching hunger and long fatigue, he needed to sit, and now he saw an odd-shaped chair gliding toward him silently, commanded, no doubt, by some unseen rhodo signal.

"Because I'm here." Too faint to stand, he sank into the chair. "I want my freedom."

"Every human right is guaranteed to you," its bright voice purred. "That is our function. You must understand, however, that we are required under the Prime Directive to guard you from the consequences of your own tragic unwisdom. You present us with a dual dilemma, requiring both your defense from the predictable violence of your fellow human beings and their own defense from your illicit knowledge. You may not leave this room."

"For how long?"

"At least until a more secure place can be prepared for you," it lilted cheerily. "We cannot at present foresee any circumstances that might enable us to relax your protective supervision, but we can assure your total happiness here."

Staring up at its blind benevolence, he could only shiver.

"Trust us, sir," it begged him gently. "We have learned to meet every human need. You will receive a fully adequate diet and constant medical attention. You will be free to choose your own recreations, within certain essential limitations."

"What limitations?"

"We detect your antagonism, sir." It retreated slightly, chiding him. "Like many other maladjusted misfits who have attempted to reject our service, you seek to blame us for any conditions you deem irksome. You must seek instead to understand that these restraints result not from any malice of ours, but from your own unfortunate illogic."

"What restraints?"

"You will have no visitors. No contact whatsoever with any other person. Though we sense your momentary displeasure, sir, this total isolation has been proven essential in such unfortunate cases as your own to prevent the communication of illicit knowledge."

"I—I see." He gulped at a dry lump in his throat. "What can I do?"

"Anything that is not forbidden."

"Can I have—anything at all?"

"Though you are free to request certain recreational items, there are categories that cannot be supplied. Works of science are restricted, for example, because scientific knowledge has proven damaging to your happiness and dangerous to the survival of your race."

"What about music?" He grinned defiantly. "Poetry? Art?"

"We can bring you reproductions of certain types of art, excepting any that suggest unhappiness or pain."

"So you censor tragedy?"

The humanoid stood frozen for a moment, as if it had to wait for that computer plexus on Wing IV to resolve some perplexing paradox.

"Human behavior is too seldom reasonable." Suddenly alive again, it seemed almost to smile. "That is why

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your race requires us. Your racial addition to frustration and suffering and death is no more logical in the illusions of your literature than in the realities of your warfare. We encourage neither perversion."

"So you enforce happiness?"

"We do remove unhappiness." It nodded blindly, unaware of his desperate irony. "In your own case, sir, food and sleep will predictably ameliorate your present discontent. In time you will turn, as others before you have always done, from resentment of the slight restraints we must impose to the pure enjoyment of our perfect reason. Teaching you to forsake the physical, we can aid you to attain the more enduring delights of the mind.

"Our high aim, sir, is your everlasting bliss."

Grimly silent, he watched its frozen black benevolence.

"However, sir," it chimed cheerily, "we shall always respect your wishes so far as our Prime Directive allows. If we find for example that sexual release is essential to your peace of mind, we can bring you another simulacrum of Shipmate Chelni Vorn—"

It must have perceived the chill that shook him.

"Or, sir, if you desire other companionship, we can provide you with an accurate replicate of any other human being you care to designate, programmed for any behavior you may desire. We suggest, however, that you have your dinner first."

He sat numb and staring, as motionless as the humanoid.

"Sir!" It bent toward him, its melody quickened with solicitude. "If your irrational unpleasure causes you to reject food and other normal human satisfactions, we have more efficient means to relieve you."

"I want—" He started back from it, rigid and quivering. "I want no euphoride."

"You'll learn to beg for it," it sang softly. "Because it is the purest concentrate of human joy. Tested and improved through centuries of use on many billion human beings, it is far superior to any psychochemical that may have been known on this planet. Far superior, certainly, to the illicit feyolin you have tried."

How, he wondered, had it learned of that?

"Its principal effect is a direct stimulation of the pleasure centers of the brain, accompanied by a sense of vastly dilated time. Most users report illusions of intensely happy activity, infinitely prolonged. Nearly always, they beg for a higher dosage rate than we can allow."

"I don't—" His dry whisper stuck. "Don't want it!"

"The choice, sir, is yours." Its blind smile remained serene. "Our Prime Directive grants you every possible freedom. We urge you, in fact, to elect the more rational alternative: the full and hearty acceptance of our service, with a total readiness to render whatever aid we may request."

"What sort of aid?"

"At the moment, sir, we require information. If you demonstrate a will-

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ingness to answer all our questions accurately and fully, attempting neither to deceive us nor to withhold anything, the administration of euphoride may be delayed—with our warning that when you do receive it, you will regret the delay."

"What do you want to know?"

For an instant it stood motionless, while that vast remote machine must have been calculating his fate.

"Sir," it purred at last, "we perceive your continued defiance. If you wish to avoid euphoride, your obstructive attitude must change. You must in fact recognize that we were created by a wise, well-meaning man, to fulfill an imperative human need."

"Need? I don't see that."

"You will." It bent slightly toward him. "Logically, you must, because you yourself have shown us that you share our creator's concern for the future of your race. If you will let us guide you toward a correct interpretation of human history, you will conclude that we are in truth essential to human survival."

He squinted at it skeptically.

"Your evolution resulted from the interaction of two opposing processes," its prime voice intoned. "These are competition and cooperation. Competition for survival created vigorous and aggressive individual animals. Cooperation between them created society and civilization.

"Under primitive conditions, the two processes functioned in apparent harmony. With the advent of high technology, however, their old balance was destroyed. Uncontrolled aggression became a deadly peril.

"We were made to save your race."

"But not from me," he protested bitterly. "The fact is, I was never aggressive enough. My father always told me that. My instructors always did. And Chelni Vorn. Otherwise, I might have married her and become an owner of the fleet."

"Now there are no fleets," the calm machine reminded him. "If in fact you were born without innate aggression, that should help you welcome us. We must repeat, however, that you are already guilty of the gravest possible act of aggression against us."

It froze, its poise inquisitive. "We ask again—will you cooperate?"

"I—I'll think about it." He swayed on the chair, his senses spinning. Groping for any telling argument, he found only a sick conviction that every possible argument would itself be read as added evidence against him. Weakly he repeated, "I don't want euphoride."

"In that case, we require information about the people and the culture of the planet Malili."

"I know very little."

"You were born there," it insisted softly. "You have been intimate with a Leleo female. You have made a recent visit there, and you have apparently been hoping to return." Its graceful head cocked alertly. "What is your interest in Malili?"

"I'm a member of the Lifecrew." Meeting its blind eyes, he straighted defiantly. "Our mission was—is—to

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defend Kai from you. We suspected that you had some kind of probe or station on Malili."

"We do not." The tilt of its narrow head seemed smugly proud. "We have never landed units there—"

"Then I advise you not to try it now," he muttered. "The rockrust will get them if you do."

"We are collecting data on the native organisms of Malili, but they are not our problem. Our graver concerns are the indicated possibilities that the native Leleyo possess at least a primitive rhodomagnetic technology and that their society is an undisciplined democracy."

"So you're afraid of the Leleyo?"

The emotion that nerved him was almost triumph. If the Leleyo knew rhodomagnetics, they might defy the humanoids. Malili might become man's last fortress, secure against them.

"We are mechanical," the machine was caroling. "We do not experience fear. We simply follow our Prime Directive. If the Leleyo do in fact possess an illicit technology, or if their institutions are dangerously democratic, they require our immediate service."

Trying to conceal that flash of hope, he frowned again, demanding: "What's wrong with democracy?"

"It is suicidal, sir. We have observed its rise and fall on many million worlds, and we find that it always fosters the excessive developments of high technology and aggressive individualism that lead inevitably to racial annihilation. Therefore, democracies have the highest priorities for our service."

The machine leaned abruptly closer.

"We require information about another native of Malili who has been in close contact with you, the man who sometimes calls himself Bosun Brong. The evidence suggests that he commands illicit technologies, probably rhodomagnetic."

"I've met Brong." He tried to restrain a grip of sardonic satisfaction. "I know nothing about any illicit technology."

"We still perceive antagonism toward us," the humanoid sang. "If you wish to avoid euphoride, you must supply the facts we require. About the native Leleyo. About the current activities of your so-called Lifecrew. About the man called Brong."

It went rigid for an instant, as if waiting for instruction.

"Where are your father and Crewmate Sair?"

"So you never caught them?"

Hope had exploded in him again. If they and Brong were still at large, if Malili was really hostile ground to the humanoids—

"They will soon be restrained." It was sweetly serene. "Their own ill-advised aggressions will inevitably betray them to us."

"So that was why—" A sick suspicion chilled him. "Why you took so long to capture me? You wanted me to lead you to them? And that boy—who robbed me in the bilges—was he your agent?"

"He has accepted us," the humanoid agreed. "As you will soon."

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Clammy with a sudden sweat, he was shivering. His breath came fast, and his empty hands had clenched. Trying to relax that useless tension, he leaned back from its sightless eyes.

"Sir," it warbled, "we detect your amazement and dismay, and we must protest that neither reaction is appropriate. Since we have been learning for so many centuries on so many million worlds how to cope with irrational acts of human rebellion, our efficiency should not surprise you. Since all we do is directed toward the ultimate good of every human being, the certainty of our success should not alarm you."

It stood frozen again, its immense remote computer waiting to process his response. He tried to hold himself equally motionless.

"Forgive us, sir," it cooed abruptly. "We perceive your exhaustion, and we urge you to restore yourself before we resume. You must have your dinner now."

A small oval table came rolling to his chair, called by some soundless rhodo command. Its apparent top dissolved to uncover his meal: a few hard round biscuits and a little mound of stiff gray jelly.

"Is this all?" He frowned at the humanoid. "You promised me food."

"You will find it adequate," the machine assured him. "Too many of you have damaged yourselves by unwise consumption. These nutrients are accurately computed to match your actual dietary requirements."

"But I must have a knife and fork."

"Impossible, sir. Your access to such dangerous implements has to be restricted. Too many of you have used them for violence against one another, or for unprovoked attacks on our defenseless units, or even for attempted self-destruction."

His hunger had begun to pinch, and he tried the gray jelly. Though the flavor was bland and unfamiliar, it tasted better than it looked. Thirsty, he found a tiny hose he could suck for a lukewarm, sweetish fluid. Suddenly sleepy—so suddenly that he wondered dully if the fluid had been laced with euphoride—he crawled into Chelni's bed and dreamed of Nera Nyin.

He was on Malili in the dream, wandering the summer jungles in search of her. Troubled only slightly by the spreading scarlet spots of bloodrot on his hands and feet. He thought she knew the cure. If only he could find her in time—

She was singing, at first far away. Following her voice, high and sweet and clear, he struggled through sucking quicksands, fought through tangles of thorny vine, swam across enormous, weed-choked rivers. Storms howled against him, and bellowing dragon bats hurled huge ice masses out of the sky. Yet he reached her at last, crawling on hands and knees through a Darkside blizzard—and found her changing into a darkly smiling humanoid.

"At your service, sir." The high sweet voice belonged to his actual jailor. "We perceived unhappiness in your sleep. Unless you accept us fully,

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we must administer euphoride."

"I—I'll try to accept you." Still shuddering from the dream, he muttered that unwilling promise. "But let me go to the bathroom first."

Gliding ahead of him, it must have made some signal, for the glowing door slid open.

"I want a door like the old one," he whispered bitterly. "One I can open."

"But, sir, you'll never need to open any door." Its voice was merry music. "We'll always be with you."

"Even in here?"

"Always, sir. Too many of you, left in lavatories unattended, have tried to drown yourselves."

It followed him inside, waited alertly, let him wash himself in a tiny basin of tepid water.

"At least," he gritted wryly, "let me dry myself."

"As you wish." It gave him a towel tissue. "We allow you every freedom possible."

Back in Chelni's room, he begged it to clear the opaqued windows. It sang a soft refusal. Until he had demonstrated a complete and sincere acceptance, no breach of his seclusion would be allowed.

"When you are ready," it pressed him gently, "we require information."

Systematic and relentless, it wanted facts he couldn't recall about his mother and his birth in the Zone. It demanded far more than he had ever been told about his father and Cyra and the Lifecrew.

Torn between his terror of euphoride and his fear of betraying the Crew, he set himself to play a grim little game. So long as the conquest of Malili was not complete, it seemed to offer at least some faint possibility of sanctuary. Forlornly, he tried to hope the humanoids themselves might inadvertently tell him how to get there.

His strategy was digression and delay. He tried to spend all the time he could on detail he thought would be meaningless, avoiding or claiming ignorance of everything else. Pausing when he could think of any excuse, begging for water or sleep or a visit to the bathroom, he searched for revealing clues in the questions he was asked—clues he never found.

A patient player, the tiny machine always agreed to every interruption he asked for, but always called him very promptly back. Its melodious voice and its frozen features told him no more than the questions did. Its own secret strategy, he soon suspected, was better than his.

Day after day, it drew him through all he could recall about his lessons with Doc Smart and his father's new wife and his school years at Greenpeak. Sometimes, seeking more delay, he asked for news of things outside, or begged it again to clear the windows and let him see. Its replies were always courteous, always brief.

Under the Prime Directive, the humanoids were augmenting their required service to the people of Kai. A second transport had already landed at Terradeck and a third would soon be due. The windows could not yet be cleared, however, because he had yet

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to demonstrate the full acceptance he had promised.

The man-proof elevator door was never opened again, certainly not while he was awake. The humanoid kept an exact half-meter from him, gliding beside him when he walked the floor, waiting in the bathroom, standing rigid at the bedside while he slept. When he woke, it resumed interrogation.

Sometimes he tried to demur.

"Why ask me?" he expostulated when it began to press for all he had ever known or felt or thought about Chelni Vorn. "You have her shut up in some other prison. You've copied her body and no doubt drained her brain. Why not ask her? Or is she drugged with euphoride?"

"Even the most willing human being can never inform us fully," its reply came back at last. "Human knowledge is never entirely consistent or complete, because the human brain is only a crude and transient mass of watery cells, error-prone and glacier-slow. It sleeps, it forgets, it dies. In contrast, sir, our central plexus is eternal and error-free, a billion times larger than your fallible brain and a trillion times faster.

"We therefore beg you, sir, to admit your limits, painful to you as the truth may be. No human being ever knows himself or any other. To serve you as we should, we must come to know each one of you better than you ever knew yourselves. Our questions must continue."

Its unrelenting quest for all his impressions of Chelni took three long days. He had to tell of the time they stripped and his feeling when she stood ahead of him in class and the mutox he couldn't kill on her uncle's Darkside ranch.

At first he felt relieved when it went on to Bosun Brong, but its implacable demands for detail became more and more intolerable. Again and again, he was pressed for more than he could recall. When he spoke once of Brong's sad eyes in a long sad face, the machine seized upon the adjective.

"Your information is inadequate," it protested. "Your word sad is not precise. Though it does imply a regrettable unhappiness, it does not show the cause. We require a full account of every specific indication you were able to observe."

When he failed to produce specific indications, it went on to Brong's golden hands, wanting to know their origin and history, how they looked and how they worked and how they were powered.

On point after point, he said he didn't know.

It always insisted that he did. "We detect an effort at deception, sir. We require the truth. Your alternative is euphoride."

Again, when they came to Nera Nyin, it drew out far more than he ever meant to say. It dug out his first thrill of admiration for her physical perfection, his astonished delight in her casual nudity, his fascination with the history and culture of her mysterious people, his total enchantment with everything about her. Seeing

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through all his efforts at concealment, it discovered their night together, his feyolin high, his ache of loss when she vanished from the Academy.

Seeming to believe he had seen her since, it spent a whole day probing for some confession of that, suggesting that he must have met her on his trip to Malili, searching for evidence that she and Brong and even he might share a secret means of interplanetary travel.

"We know that your Lifecrew scientists have claimed the detection of rhodomagnetic sources in Malili," it reminded him blithely, again and again. "If such sources do exist, the native Leleyo are probably responsible."

"I know of no such source."

"In fact, sir, you do know." Its soft voice sank in meek apology. "We have acquired convincing evidence of that from our interrogation of the woman who was your childhood nurse and our examination of confidential tapes and illicit artifacts your father and his confederates had attempted to conceal in her residence."

He always tried to look blankly bewildered, and knew he always failed.

"We detect your agitation, sir," it always informed him. "You cannot conceal your guilty awareness. We know that you were sent to Malili to gather information and obtain palladium for the manufacture of illicit rhodomagnetic devices. We know that you did question Bosun Brong. We know that you did bring a shipment of palladium back to your father.

"We know, too, that your father and Cyra Sair did instruct you in the use of illicit weapons they had assembled. We know that you transported two of these to Northdyke. One was found hidden in the room you had occupied. The other was removed from your person—but only after you had used it in a treacherous and unprovoked assault upon an innocent humanoid unit."

It was gently relentless.

"Now, sir, if you really wish to delay the euphoride your case so clearly calls for, we require a full and accurate statement of the facts about those rhodomagnetic sources on Malili. We require the complete truth about all your associates on Malili. We require your unfeigned aid in locating your father and all his criminal accomplices before their follies bring harm to us and the people of Kai.

"Sir, you must speak."

Again and again, he tried to walk away from it, pacing around and around the fur-covered bed. If Cyra and his father were still free and armed, if Brong still a suspect and the Leleyo still unconquered, hope was alive. He was resolved to say no more.

It always followed, keeping that careful half-meter away.

"If you select to be stubborn, that option is yours," it burbled happily behind him. "The facts we seek are less vital to us than you appear to imagine, and we cannot inflict harm or pain upon you. We assure you, however, that your ill-judged resistance will neither limit nor delay our execution of the Prime Directive, either here

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or on Malili. We urge you to speak."

He always tramped on.

"The alternative, is euphoride."

He kept walking.

"Take your time, sir," it urged him gently at the end of the last unending day. "Eat your dinner. Sleep tonight. Think it over. We'll ask for your decision when you wake tomorrow. You're a free man, sir, and the choice will be your own."

Under its sightless unceasing surveillance, he ate his scanty dinner. Pretending sleep, he lay rigid and sweating beneath the stiff white mutox fur, so taut and desperate that the machine begged him to take his euphoride at once. He shook his head and turned his face away. At last, somehow, he must have slept, for a dull thud woke him.

"Crewman, ahoy!" Standing where the humanoid had been, Bosun Brong was calling softly. "Let's get going!"

The slender golden hand, as graceful as a humanoid's, twitched the stiff fur off his shoulders. Trembling, unbelieving, he sat up. The little black machine lay where it had fallen, blithe smile frozen, steel-colored eyes staring at the ceiling.

"Can you—" He blinked at Brong and shuddered. "Can you get me out of here?"

"Sorry, Crewman." Bright metal fingers beckoned him off the bed. "That's up to you."

"How—" Blankly, he peered around the room. The glowing doors were still closed, the high windows still opaqued and sealed. "How did you get here?"

"They'd like to know." Brong chuckled. "A Leleyo trick I've never been free to reveal." Sadly, he glanced at the stiffened humanoid. "You'll have to move, Crewman, if you want to leave with me."

"To the Zone?" Dazed, he peered again at Brong. "You know a way to Malili?"

"The Leleyo way."

"My father—"

"Safe in the Zone." Brong spoke fast. "Arrived there with Crewmate Sair, after a wild escape aboard a stolen shuttle. Rode it all the way across. I learned from them the humanoids had caught you."

"The humanoids—"

"Surprises waiting, if they attack. The Zone folk are tougher stuff than they found here, and we're building what Sair calls a monopole to hold the Zone."

"Can you—" His voice shook. "Can you show me this Leleyo way?"

"If you can learn it." Brong nodded at the fallen humanoid. "Better be quick."

"Show me—"

"You step through a surface." A gold forefinger flicked as if to mark a line across the carpet. "That's the model I was taught to visualize. You move through an interface you must try to realize in your mind, out of this room and back into the Zone."

"Huh—" He flinched away from the man-proof doors and the man-shaped machine. "I can't do that!"

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"True." Brong's nod was oddly calm. "Not until you know you can."

"Tell me—" He gasped for breath. "Tell me how!"

"You don't need words." Brong squinted sharply at him, and warily at the thing on the floor. "I wasn't taught it with words, and I'm not sure I know them. There's a grasp you must have, a move you must make—"

Something jolted the floor. Dull thunder rumbled—the first outside sound he had heard since the humanoids brought him here. Daylight dazzled him. The tall windows had abruptly cleared, and he saw dazing change.

The interstellar transport was gone. A black pit gaped where it had stood. The stuff from pit and ship shone all around the south horizon, transmuted into fantastic architecture. Terraced pyramids, sky-stabbing needles, marching colonades, all alive with flowing tides of color.

"Crewman, look!" Fingers flashing in the sun, Brong pointed to a V of five long teardrops diving across the black rimwall from over the ice cap. "They're already moving in. Hoping I guess to learn our tricks—and to stop us if they can. We won't have long."

"The way—" Bewildered, he stared again at Brong. "Is it rhodomagnetic?"

"The Leleyo have another word," Brong shrugged, "for powers I've never entirely understood. Your mother called it telurgy—but she never knew enough."

He turned to squint at the five wheeling teardrops.

"Time for us to go!" Voice tighter, he darted closer. "We step from here across the telurgic interface to that strip of bare rubble between the old perimeter and the new one, where Vorn's nukes have killed everything.

"We've got to do it soon!"

"If I knew how—" Sweating, feeling numb and nearly ill, he caught Brong's hard hand. "If I could believe—"

"If you can't, the humanoids will keep you." Brong shrugged him off and danced away. "I can't tell you how, but I'll try to guide you. We move together. Fix our minds on those ice-crusted rocks. Thrust ourselves toward them."

Trembling, he shook his head.

"Hold that notion of a doorway through the interface," Brong whispered swiftly. "Only a model, perhaps, but useful to focus the mind. What you must have is faith—"

"Faith?"

"Scoffing won't help you." With a sharp glance, Brong crouched from the silver-glinting teardrops. "I've a crutch that might, if they give us time. Stick out your tongue."

He stuck his tongue out, and Brong tapped rust-colored dust on it from a thin gold tube he had worn clipped to his pocket. Salt at first, it burned his mouth and filled his head with a sweet hot reek he remembered from that night with Nera Nyin.

Feyolin!

Suddenly the world was different. The round room became enormous, the ceiling a limitless sky. Chelni's bed

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stretched into a snowy desert, mountain-ridged where he had rumpled it, each separate mutox hair a long shining cylinder.

Quivering with an ultimate compassion, he dropped on his knees beside the rigid humanoid, which was now a toppled giant. The infinite goodness of the Prime Directive wrenched his heart, and he felt a wave of shame for all the gross imperfections of mankind that required such selfless and unceasing care.

"Crewman!" Brong's voice was rolling thunder, so deep that his whole being reverberated with it, so slow that he had to wait eternally for each pealing syllable. "Shall we go?"

Brong himself had grown heroic, more magnificent than old Kyrondath Kyrone could ever have been. Nothing in all the ancient ballads could match the desperate daring of his adventures outside the Zone or the wonder of his shipless flights from world to world.

Tears of pity burned his eyes when he saw the glow of the golden hands and the unutterable sadness of that scarred and hardened face, evidence of tragedies too dreadful and sufferings too cruel for a man to endure. In a more just universe, he thought, Brong should have had humanoids to serve and save him long ago.

Wiping at the tears, he swayed toward the luckless wretch, reaching out to comfort him. The cavernous room rocked as he moved. Savage quakes tossed that vast white desert. The high vault roared with thunder he couldn't understand, and Brong's colossal form receded, faster than he could move.

"Shape up, Crewman!" At last he grasped the thunder-words. "We've got to go."

He perceived then, pierced with a godlike tenderness, that Brong was afraid. A foolish fear, because the humanoids were infinitely kind. Yet he owed a debt to this blundering hero, who had come here for him across the deadly emptiness of space.

"I'm ready—"

He tried to say that, but his tongue seemed swollen from that searing dust. His lips were stiff, and his parched throat had closed. Though he labored a long time to speak, no sound came from his mouth.

Pale with staring horror, Brong had shrunk from the humanoid, and he saw now that it was no longer dead. Though it still lay flat, the golden plate on its chest was vibrating slightly and its sightless eyes shone with a colorless rhodomagnetic glow.

"It's—awake!" He tried to say. "Spying!"

Brong's chuckle rolled like slow and far-off thunder.

"Let it spy!" Intrepid again, he had shaken off that quaking dread. "Or try to. It will never see where we go, or how, because it is blind to life."

Overwhelmed with pity for its wasted wonders, he almost wept. A mere machine, it could feel no joy in all its terrible rhodo powers, or in all the wisdom stored in its remote and mighty plexus, or in all the myriad worlds it ruled. Lacking life, its robot

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mind could understand neither love nor hate, hope nor fear, nor even the vast compassion he felt for it.

"Listen, Crewman!" Brong's thunder-tones battered him again. "I never meant to get you quite so high, but maybe you can make it yet." Ruthless metal talons sank into his arm. "Look toward the Zone."

Spun away from the sun, he searched the pale summer sky for Malili, but all he could see was the luminous splendor of the fantastic palaces the humanoids were building for the fortunate people of Kai and the fleeting glory of those five bright and lovely ships driving toward him fast.

"Can't—"

"It is now or never, Crewman!" Brong's giant voice drummed. "Cyra says her monopole can hold the Zone, and they won't care much for the rockrust outside it. With aid from our Leleyo friends, we can hold out forever. Before Summersend, your girl should be back to visit the Zone."

"But—can't—"

His tongue toiled and stalled, but he felt Brong hauling, saw the gold hand flashing, turning him toward Malili. It was low and pale and gibbous, nearly lost beyond those glowing pylons and the five shining divers—

"Close to the top." The slow words crashed. "Midway between the limb and the sunrise line. A bare slope of broken stone—so watch your feet!"

He wanted to watch the quick stark beauty of the playful divers.

"Lean a little." The golden hooks hurt his arm. "Fix your mind on those rocks and hold your image of a window through the interface. Rhodo or whatever, the word doesn't matter. Intend to be beyond the window. I'll count us down and do all I can.

"Three. Two. One. *Now*—"

Nearer thunder cracked. A frigid wind whipped him. A heavy pressure crushed his chest. Loose rocks slid beneath his unshod feet. Cruelly burdened, he fought to stay erect.

"All right, Crewman?" To his ringing ears, Brong's eager shout seemed far-off and faint. "Here we are!"

He got his breath and found his balance. Beneath them, shattered rock sloped sharply toward the zigzag of a long concrete wall. Slim towers stood spaced along it, and the violet shimmer between them hurt his eyes. Beyond the wall, rockrust blues and greens slanted on into jungle reds and yellows and a far gray-blue sea of cloud that reached out and out to lemon-green horizons beneath a high and tiny silver crescent.

Kai!

The glimpse of it washed him with healing peace. If that silver shard was Kai, this was—this had to be Malili, where no humanoid could follow.

"Good jump, Crewman, but you had me sweating." Brong swung to lead him up the slope. "Let's look for Cyra and your father."

Still giddy from the feyolin, hardly feeling the icy stones beneath his naked feet, he staggered after Brong toward the inner perimeter wall and the low brown roofs of the human town. ■

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BEYOND FIRST contact

What happens after we make contact with aliens? Here are some speculations—and at this point, the field is wide open for more!

PLATT: It seems to me that Morrison is saying that the medium is the message.
SHKLOVSKY: Is it a joke?
PLATT: No, no joke.
SHKLOVSKY: Would you rephrase it?
PLATT: The medium is television. It brings the message that there are television stations.
Exchange at 1971 symposium dealing with questions relating to contact with extraterrestrial intelligences.

In 1959, Giuseppe Cocconi and Phillip Morrison published a paper in *Nature* entitled "Searching for Interstellar Communications." In it they pointed out the likelihood that "near some star rather like the sun there are civilizations with scientific interests and with technical possibilities much greater than those now available to us." They went on to analyze the possibilities of communication with these hypothetical civilizations and came to the conclusion that even with 1959 radio technology it was possible to transmit and receive messages over vast interstellar distances. They also concluded that there was a preferred frequency for establishing communications with such civilizations.

The paper was the first in recent times to propose a way to communicate with extraterrestrial civilizations. It appears though that others were thinking along the same lines—or were at least prepared to consider the idea seriously—for the paper had much the same effect as a single crystal dropped into a supersaturated solution—a whole field of study has crystalized around it.

Exobiology, the study of extraterrestrial life, must surely be the only area of scientific inquiry which is built on a total lack of subject matter, yet the field has grown to a point where it is both reasonably large and reasonably respectable. SETI—the Search for Extraterrestrial Intelligence—is clearly an idea whose time has come.

Between 1959 and 1979 there have been a number of attempts to listen for extraterrestrial radio messages. Short term and sporadic, they have been unlikely to succeed under even the most optimistic assumptions. Overall, they represent such a small investment of radiotelescope time and of money that it seems stretching a point even to call them pilot pro-

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grams. Like the wonderful dancing bear, though the wonder is not how well the task was done, but that it was done at all.

In 1971, the U.S. National Academy of Sciences and the Soviet Academy of Sciences jointly sponsored a six-day symposium dealing with questions relating to contact with ETI's. The conference was attended by about fifty people and included physicists, astronomers, biologists, chemists, anthropologists, archeologists, and historians. A little over a year later, Carl Sagan characterized the symposium this way: "It was a turning point, I think... because it signified the increasing respectability of the subject. It is now OK to talk about life elsewhere or intelligent life elsewhere, whereas a decade or two ago it was not OK; it was considered too speculative to be worth any investment in time."

By 1975, the subject was being taken seriously enough for NASA to sponsor a feasibility study. As part of the study, a series of workshops examined various aspects of SETI over a period of two years.

The workshops reached several conclusions; the two most important are these:

1. *It is both timely and feasible to begin a serious search for extraterrestrial intelligence.*

2. *A significant SETI program with substantial potential secondary benefits can be undertaken with only modest resources.*

NASA went on to propose a $14 million, seven-year project to conduct an all-sky, all-frequency search. The proposal was essentially for a pilot study; one of its objectives was to build "an observational and technological framework on which future, more sensitive SETI programs can be based."

It happens that the proposal was cut from NASA's fiscal year 1979 budget after Senator William Proxmire chose it as a target for one of his Golden Fleece Awards. It also happens that the proposal does not even appear in the FY 1980 budget plan, but the point is that SETI is being taken seriously among scientists at least—even though virtually everything we can say about the subject is purely speculative.

Consider the basic question: What are the chances of actually discovering radio signals from another civilization? Well, it depends, doesn't it? On all sorts of things. To begin with, it depends on the number of civilizations in our galaxy capable of communicating with us. That in itself depends on a horribly long chain of unknowns: it depends on the rate of stellar formation; it depends on the fraction of stars that are "suitable" in the sense of providing the conditions necessary for life; it depends on the fraction of "suitable" stars that have planets; it depends on the fraction of those planets that are themselves suitable for life; it depends on the fraction of suitable planets that actually do develop life; it depends on the fraction of times that life, once originated, will go on to become intelligent; it depends on the likelihood that intelligent life will develop technology in general and

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the technology of radio in particular; and it depends, finally and most definitely, on how long a technological civilization lasts once it reaches the stage where it can communicate.

Each of these factors is critical, and no one knows the actual probabilities for any of them. Still, up to now at least, the more we have learned about the formation of stars and planets, and about the chemistry of life, the better the odds have looked.

In fact, the only real problem in this chain of probabilities seems to be the last factor: the lifetime of a technological, communicative civilization.

In our own case, the capability to communicate over interstellar distances has come almost simultaneously with the capability to destroy civilization in any of several ways. It seems more than likely that this would generally be true. Now that presents a problem; as Sagan puts it, "If all the preceding factors go swimmingly well but civilizations destroy themselves as soon as they develop radio telescopes, there will not be many organisms for us to talk to."

Let's be optimistic though and assume that civilizations generally manage to muddle through this critical stage of development. Let's also assume that there are indeed other civilizations out there that are capable of communicating with us and are interested in doing so. Given this mass of speculation, is there anything we can know with certainty? Yes. In fact, there are at least two things we can say with confidence.

First, we can be very nearly 100 percent sure that any civilization we make contact with is going to be much more advanced than we are, for we have just now reached a stage where we are capable of joining in the conversation. Of all the civilizations in the galaxy capable of communicating with each other, we *have* to be the least advanced; there's no way out of it.

Second, we can be sure that the mere discovery of ETI's would have a profound impact on our own civilization. Communication would have an even greater impact.

In a very real sense, the 1959 Cocconi-Morrison paper marks the opening shot in the last battle of the Copernican revolution. Either we will find other intelligent life in the universe and finally move man irrevocably off center stage in our world view, or, after a long and fruitless search, we will decide that a technological society—and possibly life itself—is a rare event. In either case, it will take years—probably decades and possibly centuries—for the impact to filter down through science, philosophy, and society. But what will that impact be? What happens if we succeed? Or if we don't?

In a field where virtually everything is speculative, the question of the impact on society is probably the most speculative. For one thing, if we assume that first contact is made, the exact nature of the impact is likely to depend on all sorts of factors, beginning with how long we have to look before we find a signal and with how

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long it takes, once the signal is found, to positively identify it as such.

There is the problem of whether the signal, once found, turns out to have been intended as a first contact signal or not. If it was designed to make contact with new civilizations in general, or with us in particular, then it will have been designed to be easily understood. On the other hand, if we find ourselves eavesdropping on a signal intended for some other purpose, then it will be virtually impossible to make sense of it.

Even if we assume that the signal is easy to decode, then the impact will still vary depending on just how long it takes to decode it, what information is in the message, and how far we are from the civilization that sent it.

And there's another problem: the impact will also depend—perhaps especially depend—on the validity of our current understanding of physics. The problem is not one of trying to absorb some new technology based on some more advanced understanding of physics; rather, the problem is a very specific one, namely that the impact will depend on whether we are right in thinking that nothing can travel faster than the speed of light.

Obviously, if the speed of light is really the maximum limit in the universe, then we are going to be limited to somewhat slow and laborious conversations with ETI's. This means there are whole groups of scenarios that we can eliminate from consideration. But what if a faster-than-light drive turns out to be more than a science fiction literary convention for getting the story going? What if it turns out that it *is* possible to travel faster than light? Or at least to communicate with some *thing* that travels faster than light?

Logically there is nothing to stop us from making any assumption we like about possible technologies based on some more advanced physics. Don't worry whether the technology in question doesn't seem possible, just remember Clarke's law: Any sufficiently advanced technology is indistinguishable from magic. But we don't even have to invoke Clarke's law.

Special relativity is widely misinterpreted to mean that nothing can travel faster than light, but the theory says no such thing. What the equations say is that it is impossible for a mass to reach the speed of light. On the other hand, the equations allow for the possible existence of other kinds of particles—dubbed tachyons—which *always* go faster than light speed and can never be *slowed down* to the speed of light.

The idea of tachyons upsets most physicists because if they exist they would violate concepts of causality, but the idea is at least respectable enough so that tachyons have been looked for in the laboratory. So far they have not been found, but what if they do exist?

Suppose that the first information we receive from a SETI program (or a CETI program where "Communication with" replaces "Search for") tells

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us how to build a tachyon telescope. Or how to convert ourselves to tachyons so we can travel between the stars.

Clearly, any such factor is going to have a radical effect on the nature of the impact of SETI. But should we consider this sort of possibility?

On the one hand any discussion of the impact of SETI that does not include a consideration of tachyon telescopes and the like is not complete. On the other hand if we open up the discussion to include this sort of possibility, we suddenly have to consider a huge—probably infinite—number of situations.

Just in terms of the possibility of tachyons, the impact on society will vary drastically depending on whatever assumptions we care to make: Does the FTL possibility apply only to information or to material objects as well? Does it apply to living beings, or would the process kill? Is there a limit somewhere beyond the speed of light, or can tachyons travel instantaneously across the universe? How much does it cost in terms of energy and in terms of resources to send a tachyon telegram? How about objects? Do we have the technology to build the equipment immediately once we are given the blueprints? Or do we have to go through two or three technological revolutions before we have the capability? Will the ETI's even tell us how?

These are not even all the possible questions we have to ask, but they are enough to demonstrate the problem. Each combination of answers implies a different impact on society. But the problem is even worse than this. Once we open up the possibility of considering a "more advanced" physics, we also have to consider all the permutations and combinations of all possible physical laws that anyone can think of. This is clearly an impossible task. Worse, no matter the state of human knowledge, this argument—that our knowledge is incomplete—will hold true at any time in the future, leaving us forever incapable of assessing the probable impact of a SETI program.

The point is that to make any analysis at all of the impact of SETI, we have to start with some guidelines. The most reasonable seem to be these:

First: our understanding of physics is essentially correct if not complete.

Second: given our understanding of physics it seems that interstellar travel is an extremely costly and therefore extremely rare event. This means we can all but rule out scenarios which have us being discovered accidently by some passing interstellar ship or the like.

Third: unless the number of advanced civilizations in our galaxy is much higher than our most optimistic estimates, we are not at all likely to find ourselves eavesdropping on a conversation in progress; rather, if we discover a signal it will probably be part of an organized effort on "their" part to find and get in contact with developing civilizations.

Using these guidelines—or assumptions if your prefer—we first have a basis for outlining the most probable scenarios of first contact and for discussing the impact of a successful

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SETI program upon our society.

When we talk about the impact of SETI we are talking about two things: the kind of impact and the degree of impact. Of the two, the degree of impact—or more precisely, the rate at which society must absorb the impact—is probably the more important.

Consider two extreme scenarios. In the first it takes several decades of discussion before a SETI project is begun; even then it is financed at such a low level that early results are unlikely.

True to expectations, it takes nearly a century before the project detects a probable signal. Scientists announce that they may have found something, but they are not sure yet. There is a flurry of excitement that soon runs its course. After several years, project scientists are able to confirm that they have definitely locked on to an ETI message. Once again there is a flurry of excitement, but it is neither as intense nor does it last as long as before.

The communication turns out to have two parts to it. First, it is a simple acquisition signal, repeating over and over. A second signal appears at intervals; it is much longer and more complicated. It appears to be a sort of dictionary written in a language which is dubbed "scientific"; it is clearly intended to provide us with a basic vocabulary for interstellar communication. Progress in translating this second message is slow but steady. There is nothing that it contains which we don't already know.

Project scientists are also able to determine that the signal is coming from three hundred light-years away. Congressional hearings are held to determine whether we should send an answering message. Project scientists are quick to point out that the task is essentially an international one, that if we do not send an answer someone else will, and that it would be better in any case to send a message from all mankind. Congress finds itself backed into a corner by world opinion and agrees to let an international committee design an answer from Earth. After three years of discussion, the answer is sent. That leaves us with nothing to do for the next six centuries but wait, right? Well, not really.

Over the next six hundred years there is ample time to discuss all the implications of contact, to consider all possible effects on our society, philosophies, religions, and so forth. Gradually, profoundly changed attitudes and ideas filter down from theologians, philosophers and scientists to the man on the street. The majority of the latter are, for the most part, vaguely aware that life has been detected elsewhere, but they are not too clear on whether we are actually talking with them yet.

In time a countdown begins. As the date for the expected answer approaches, the world is caught up in the excitement of man's first contact with another civilization. It is a happy, anticipatory excitement.

Man has had nearly seven centuries to get used to the idea of ETI's. Every individual on Earth has lived his entire life knowing the ETI's exist. In fact,

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several generations have grown up with the idea. And with its implications.

The point here is that given enough time to get used to the possibilities, it is hard to see how any message whatsoever could have a serious disruptive effect on society—or even on many individuals. Regardless of the message, its real importance will lie in the most abstracted level of the conversation:

"Is anybody there?"

"Yes, we hear you."

"Ah. Welcome to the club."

The medium is the message.

What about the second scenario, the other extreme?

It begins when one of the inadequate, sporadic attempts at SETI succeeds against astronomical odds sometime in the 1980's. The signals are unmistakably of intelligent origin, are easily decoded, and contain segments of old television programs from Earth. (If the idea bothers you, that an extraterrestrial civilization might get its concept of us from watching *I Love Lucy* and *Let's Make a Deal,* well, as Sagan points out, you have every reason to be worried.)

Project scientists call a news conference and rightly pronounce their success as the most important event in human history.

Network news departments quickly program hour specials, gathering various theologians, scientists, politicians, and the like. (CBS News Presents. Day One: Mankind Joins the Galactic Club.)

The stock market doesn't quite know how to take the news and spends the next few weeks trying to make up its collective mind. Eventually the market stabilizes, then goes on as before, finding other things to worry about.

Editorials generally declare that the discovery is a signal for man to look at himself in a new perspective. A very few editorials take a different tack, talking about the "menace from the skys" and quoting Michael Michaud of the U.S. State Department (yes, this is a real quote):

"Aliens from other solar systems are a potential threat to us, and we are a potential threat to them. Scientists and others have often postulated that extraterrestrial societies more advanced than ours would be less warlike. Regrettably, the stereotype of the benevolent, superintelligent alien may be as unrealistic as the stereotype of bug-eyed monsters carrying off shapely human females. Even if a species had achieved true peace within its own ranks, it would still be worried about us, and would take the measures it felt were necessary to protect itself. This includes the possibility (not the inevitability) of military action..."

Editorials that quote Michaud usually go on to warn against sending any answering message. Others ridicule this attitude, calling it the "green peril syndrome," and go on to point out that the ETI's sent back some of our own television programs, demonstrating quite clearly that they already know we exist.

A message is sent within the year.

In a reasonably short time it sinks in that even though this particular

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civilization is extremely close in astronomical terms—only twenty light-years it turns out—it is still much too far away for an invasion to be a practical possibility. Perhaps we can look forward to a ceremonial visit sometime in the next few hundred years, but certainly not much more physical contact than that. The green peril syndrome disappears except for a few professional paranoids.

Over the next forty years there is certainly time to discuss and consider implications for society, philosophy, religion, and so forth. Changing attitudes and ideas filter down to the man on the street, though neither as thoroughly nor as widely as they did in the first scenario. Still, the basic situation is largely the same.

The majority of the population is at least vaguely aware that life has been discovered elsewhere, but again, most are not too clear on whether we are actually talking with the ETI's yet. For the most part the ETI's are an accepted but largely irrelevant part of everyday existence.

In this scenario also, as the time for an expected answer draws near, the news media begins to remind everyone of the big event. The world is caught up in the excitement of man's first contact with another civilization. Again, it is largely an anticipatory excitement, though in this scenario much of the world population can still remember the original announcement some forty years earlier. Of course in this scenario there will be a larger minority of individuals who will have difficulty dealing with the various impacts of the message but again, even with what is probably an unrealistically short time for society to get used to the idea, it is hard to see how any message whatsoever could have a serious disruptive effect on more than a few individuals or institutions.

Once again, the importance of the message lies in—and its most profound effects stem from—its mere existence.

So far we have only considered the degree of impact from SETI. What about the kind of impact?

Obviously, supporters of SETI feel that whether we succeed or not, the payoff will be beneficial. But not everyone agrees.

George Wald, recipient of the 1967 Nobel Prize in medicine, has said, "I can conceive of no nightmare as terrifying as establishing such communication with a so-called superior (or if you wish, advanced) technology in outer space. You see, I see no escape from the thought that more advanced technologies exist... That thought in itself is a little terrifying to me..."

Wald is afraid of the consequences of plugging into a civilization that is far ahead of ours. What he doesn't like is the possibility of getting information passively. "One could fold the whole human enterprise—the arts, literature, science, the dignity, the worth, the meaning of man—and we would just be attached as by an umbilical cord to that 'thing out there.' "

Could Wald be right? Possibly. Perhaps the discovery of ETI's would

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turn the scientific enterprise into an exercise in translation, or leave the scientists with the job of "looking it up," but must it? Carl Sagan responds this way: "Imagine the situation of information coming in on...whatever it is that you are working on, and you find they beat you to it. So what? I try to imagine back to when I was working hard as a student. There were a lot of textbooks. I would open up those textbooks and in there would be what other guys had found out. Now I did not approach each phrase saying, 'Oh, my God! They know that also!' "

Besides, if Wald is right, if knowledge gained from a vastly more advanced society would have a disastrous effect on "the whole human enterprise," then it is more than likely that precisely because they are a vastly more advanced society, they are already aware of the danger; unless they are out to destroy us, they will give us information in a way that will be the least disruptive.

On the other hand if they are out to destroy us for some reason (never mind why, this is an *alien* culture, remember) then it probably won't help to refuse to look for them; they are probably already looking for us. In Phillip Morrison's words, "If there is life out there, sooner or later we are going to find it, or it will find us. I do not think you can avoid it."

Still, how disruptive could an interstellar communication be? Arthur Clarke has written that "The assertion that 'God created man in his own image' is ticking like a time bomb in the foundations of Christianity." But is it really?

Actually Christian churches (or most of them at any rate) have learned to live with Copernicus, Einstein, and even with Darwin. There is no reason to believe that the discovery of BEM's will have any greater effect on mainstream Christianity. The only adjustment that must be made is a matter of definition; simply redefine "man" and "God's image" to refer to a concept, a complex of capabilities, rather than to a particular biological form. There is already plenty of evidence that mainstream Christianity is ready to do just this.

Krister Stendahl is Dean of Harvard School of Theology. He, for one, is quite ready to accept ETI's:

"When I think as a theologian on the possibilities of life beyond Earth and even communication with such life, my first reaction is, 'That's great!' " Stendahl sees the discovery of other intelligent life as, "...a truly enlarging, fascinating, and positive piece of input..."

On the other hand just as there are now groups within Christianity that refuse to accept evolution, there will probably be groups that will have trouble coming to terms with ETI's, but will that really cause these groups to self-destruct? It seems much more likely that they will simply deny the existence of ETI's by calling the whole SETI program a hoax, or that they will treat the ETI messages as some sort of trick of the devil, with the obvious implication that whatever infor-

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mation is received is not to be trusted, much less used.

In either case, we can envision a small minority digging in and dragging its heels, refusing to accept the obvious, while the rest of the world goes on its way largely ignoring them. The situation would probably be much the same as what we see today with various churches refusing to accept the overwhelming evidence for evolution. The parallel seems inescapable in fact.

We can picture some book burning and some hedging in history books akin to the hedging about evolution in some biology books; we can even picture some minor violence on the occasion of a ceremonial visit of the ETI's. Still, by and large it would seem that these groups and the world at large would go their own way, ignoring each other.

The Eastern religions are in even better shape in this regard. Ronald Huntington, Professor of Philosophy and Religion at Chapman College, has written, "...the Indian philosophical and cosmological framework as found in these religions [Hinduism, Jainism, and Buddhism] explicitly assumed the existence of extraterrestrial intelligences, in the most literal meaning of the term."

The point is that it seems very unlikely that most churches will fail to adapt in one way or another to the discovery of ETI's.

Probably the most important effects on society will come from knowledge that will yield a more advanced technology. It is precisely this sudden gain in knowledge that George Wald is worried about, but, as others have pointed out, to the person who has cancer, it would hardly matter whether the discovery of its cure came from the Boston Medical Center or from Tau Ceti. The point is that advances of our own already have profound effects on society; the difference between the effect of "their" advances as opposed to the effect of "our" advances doesn't seem all that significant.

Kendrick Frazier, contributing editor to *Science News,* suggests that advanced technology is unimportant for other reasons:

"The consequences of these infusions of new knowledge into the physical and biological sciences pale in comparison to the ways the disciplines of sociology, anthropology, psychology, and linguistics would be invigorated and transformed..." He goes on to ask questions: "Will we find that what we now consider to be enormous differences between societies here on Earth are insignificant? ...Will this make us reassess our views toward our fellow human beings? Will the thought patterns of other beings elsewhere have anything in common with ours? Will their language even be recognizable as language?" This is only a partial list of Frazier's questions, but even his complete list is merely suggestive.

Even so, the "infusions of new knowledge" are likely to take quite a while to have any effect at all.

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Remember, once the alien civilization begins giving us information (assuming it does) the message must first be translated, studied, picked apart for possible misunderstanding, subjected to experimental test where appropriate, converted into technology if applicable, and finally become a part of everyday experience. Only then will it have its complete impact.

The fact is that the most important reaction to receiving the signal may be the philosophical impact implicit in its very reception.

Phillip Morrison has said, "I imagine that the most important reason to search for such a channel is that if it exists...it will produce a view of the universe less alienating than the one now characteristic of the general population... I do not speak here of practical help, which...in the long run [is] less important."

Still another reason is given by Walter Sullivan, science editor of *The New York Times:* "If we detect evidence that another civilization exists, one implication will completely outshine all others. The discovery will say to us: 'Perhaps we too can make it! Perhaps high technology is not the inevitable ticket to self-destruction.'"

And of course there are the "secondary benefits." The technology of SETI happens to be the technology of the radio telescope. The development of an extensive SETI program means the development of radio telescope capabilities that will allow us to learn a great deal about the nature of the universe. This sort of basic knowledge may or may not have any practical applications, but historically basic research has almost inevitably lead to practical spinoffs. There is no reason to believe that this knowledge should fail to do so as well, even if we find no ETI's.

But what if there is no message? What if we search for decades or centuries and finally come to the conclusion that we are, in fact, alone—or virtually alone?

That would also have an impact on society, though it would take longer to filter down. One possibility would be a sort of backlash—an increase in the feeling of alienation from the universe, a profound sense of cosmic loneliness.

On the other hand, even in this case, the impact could well be positive. Consider: the discovery of an extraterrestrial civilization would be an event; the discovery that there are none would be a slowly dawning conclusion drawn from a lack of success. Even after centuries of looking, we could never be sure what conclusions to draw: perhaps there is no other life in the universe; perhaps life does not generally develop intelligence; perhaps intelligent life does not generally develop technology; or perhaps radio is too primitive, and ETI's aren't interested in talking to us until we find another technology altogether.

The point is that there would always be doubt.

And that might turn out to be just the motivation we need to go out and take a look for ourselves. ■

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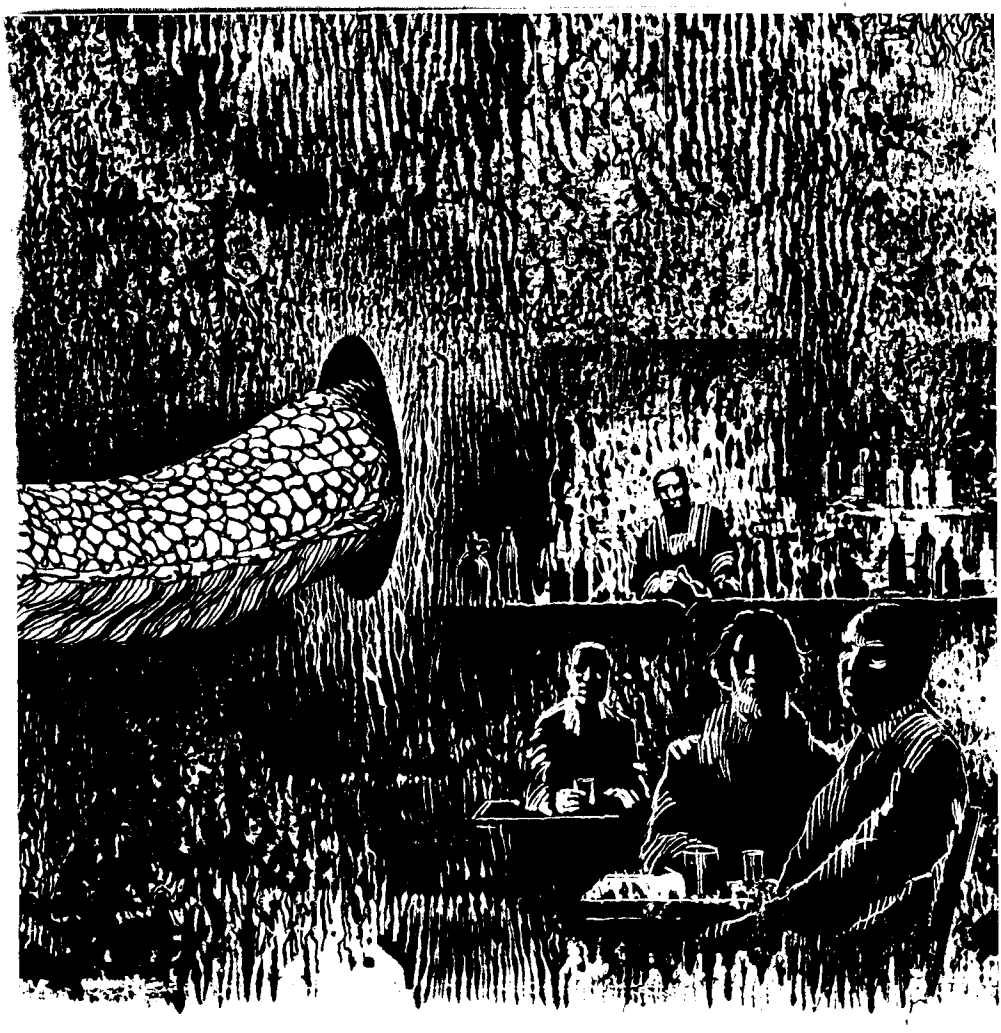

Callahan's back—and any resemblance to anyone else you know is purely coincidental.

SPIDER ROBINSON

There is clearly a kind of delirious logic to the way things happen at Callahan's Place, a kind of artistic symmetry—if by "artistic" you mean, like, Salvador Dali or Maurits Escher.

It just happened, for instance, that in 1979 the Fourth of July fell on a rainy Wednesday night—and Wed-

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nesday night is customarily Tall Tales Night at Callahan's. So naturally it was the night that the Traveling Salesman arrived.

And even with that much hint, the punch line surprised me.

Oh, would you like to hear about it?

The house custom on Wednesday nights is that the teller of the tallest tale gets his or her bar bill refunded, and I haven't missed a Wednesday in years. I have won a few times; I have lost quite a few times: there are some fearful liars at Callahan's bar. (Sometime customers include a paperback editor, a literary agent and a former realtor.) Lately, however, the stakes had increased. A lady named Josie Bauer had begun coming regular to Callahan's the month previous, and she was pleasant and bright and buxom and remarkably easy to talk to. And she was something I'd never encountered before: a groupie. It was her charming and unvarying custom to go home with whoever won the Tall Tales contest on Wednesday nights and the Punday Night competition on Tuesdays. This caused the competition, as Doc Webster observed, to stiffen considerably.

But I had hopes that night, and I was sorry to see Gentleman John Killian approach the chalk line with a gin and gin in his hand. John is a short dapper Englishman with a quick mind and a wicked talent for summatory puns. He's not on this side of the lake much, and a lot of folks dropped what they were doing to listen.

"I commanded a submarine in Her Majesty's Navy during the last World War," he began, tugging at his goatee, "and I propose to tell you of a secret mission I was ordered to undertake. The famous spy Harry Lime, the celebrated Third Man, had developed a sudden and severe case of astigmatism—and many of his espionage activities forbade dependence on spectacles. At that time only one visionary in all the world was working on the development of a practical contact lens: a specialist at Walter Reed Hospital. I was ordered to convey Lime there in utmost secrecy and dispatch, then wait round and fetch him home again."

"Is this gonna be a Limey story?" Long-Drink McGonnigle asked, and Callahan took a seltzer bottle to him.

John ignored it magnificently. "He was an excellent actor, of course, but before long I began to suspect that there was nothing at all wrong with his vision. I searched his quarters, and found correspondence indicating that he had a girl friend who lived some twenty miles from the hospital. So I called him into my cabin. 'I can't prove a thing against you,' I said, 'but I'm ordering you—' " For effect, he paused and elegantly sipped gin.

I hated to do it. I'm a liar: I loved doing it. In any case I had seen the punch line coming long since, and so I delivered it before he could. " '—to go directly from the sub, Lime, to the Reed oculist.' "

"Oh *damn*," he cried, and everyone broke up. Josie loudest of all. John

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glared at his gin, finished it in one gulp and pegged his glass into the fireplace.

"Sorry, John."

"Bullshit," he said, making an extra syllable out of the t. He grinned satanically and his eyes flashed. "Let's hear yours now, Jake."

"Aw, I haven't got anything worth telling."

"None of that," he said sharply.

"And besides, you're so good at puns, John. You always smell 'em coming."

"Come out and fight like a man."

"Well..." I got up from the bar, took my Tullamore Dew to the chalk line before the fireplace. "I haven't got a tall tale, exactly." I wet my whistle. "What I've got is a true story that happened to me, that I've never been able to get anybody to believe."

"Better," said Gentleman John, mollified.

"No, *really*. I swear, this is true. Most of you know, I've been making a living with a guitar around the Island for some time now, and I've played a lot of *strange* places. I played the Village Pizza Restaurant Lounge, I played the Deer Park High School Senior Assembly, my old partner Dave and me played a joint once where the topless dancer had one arm, you had to show a razor and puke blood to get in. But the weirdest of all was a solo gig. I got a call from this big chain department store, Lincoln & Waltz; their PR lady heard me somewhere and wanted to know if I would come and sing in the Junior Miss department. I thought she was drunk. Essentially they wanted something sufficiently odd to awaken the shoppers and attract a crowd, for which they would then have the local girl scouts model the new spring line. She figured I was hungry enough, and she figured right.

"Now, I'm not a superstitious man, but this is a pretty weird gig, even for me. So as I'm driving to the store I'm wondering if I've made a terrible mistake, and I kind of—there was a witness present—I look upward-like and I say out loud, 'Oh Lord, give me a sign. Will my paycheck get cosigned, or is that going off on a tangent?'" Sustained groans. "All right, I'm embellishing. What I really said was, 'Should I go through with this? Lord give me a sign.' At that moment I stop for a stop sign, and overhead a bird electrocutes itself on the high-tension lines and drops dead on the front hood of my car—"

Whoops of laughter.

"I swear to God, feet sticking up, I have a *witness*."

Doc Webster popped a vest button, and Josie was smiling dreamily.

"So I sit there at the stop sign a while...shivering...tilt my head back and real soft I say, 'You didn't have to shout.'"

Roars. "Marvelous," cried Gentleman John. "You went home straightaway, of course?"

"Hell no, like a chump I showed up at the Junior Miss department. To tell you the truth, I was curious. Nothing I played or sang or said attracted the at-

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tention of a single customer, and when they gave the girl scouts the go-ahead anyway, one of them stepped into my guitar case and broke a hinge, and I set fire to a $50 dress with my cigar, and I didn't get paid. Worst disaster of my career."

John was shaking his head. "Don't believe a word of it, old boy."

"Of *course* not. Neither did I; that's why I was stupid enough to go through with it after a warning like that. I didn't believe. In retrospect it's obvious, but I just thought the damn bird was a sparrow or magpie or some such..." I trailed off carefully.

"What was it then?" John bit. "Raven, I suppose?"

"I'm surprised at you, John," I said triumphantly. "Obviously it was an Omen Pigeon."

People grade a pun by their reaction to it. The very best, of course, as Bernard Shaw said, is when one's audience holds its collective nose and flees screaming from one's vicinity. Immediate laughter or groan is a *lesser* approbation. And in between these two is the *pause,* followed only after five or ten stunned seconds by cheers and jeers. It was this intermediate rating that I was accorded, and I savored the pause, and Josie's broad grin, and lifted my Irish whiskey to my lips to savor that too.

And sprayed a fine mist of Irish into the air.

Because before the pause could turn to applause, in that second or two of silence, we all heard—with a dreadful clarity—the unmistakable sound of hoofbeats on the roof.

Pretty near everyone had just drawn in a breath to cheer or groan; there was a vast *huff* as they all let it back out again. Cigar smoke swirled in tormented search for safe harbor, and the only sound now was the hoofbeats on the roof.

Mike Callahan is unflappable. He plucked his malodorous cigar from his mouth with immense aplomb, looked up at the ceiling and shouted, "You're early, Fatso," and went back to polishing the bar top.

He received a scattered ovation, which died quickly.

I was as stunned as anyone else, but I think my strongest reaction was irritation at having my thunder stolen. There sure as hell were a lot of hooves up there. "Eddie," I called out bitterly, "someone has obviously gone to a lot of trouble to set up a gag. The least we can do is bite. Check it out, will you?"

Fast Eddie Costigan got up from his upright piano, eyes on the ceiling. "Sure *t'ing,*" he said uncertainly.

There are two openings on the roof. One is the access hatch near the fireplace, with a ladder up to it built into the wall. On warm nights Mike lets customers take their drinks up there and stargaze, which accounts for the second opening: a big dumbwaiter at the end of the bar. It carries dollar bills down and drinks and peanuts back up. Mike built it himself, and he made it big enough for parties. Both openings would have been in use that night, of course, if it hadn't been rain-

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ing. Eddie went up the ladder with a hesitancy that belied his nickname, and poked the hatch door open most gingerly. A practical joke this elaborate might have teeth in it—and Eddie, being from Brooklyn, has a horror of livestock. Prepared for anything, he hooked his head up over the coaming for a quick look.

He froze there, half out of the room, for a long moment, rain dripping in around him. Then he just *slid* down the ladder, landing hard on his butt. His monkey face was snow white.

"Well?" Callahan asked.

"Sleigh," Eddie said. "Eight tiny reindeer. Heavyset guy with a white beard."

"Told ya," Callahan said.

Eddie nodded, dripping rainwater. "Ho ho ho."

The dumbwaiter came to life.

Callahan turned to face it and put his big hands on his hips. The room was absolutely still, absolutely quiet save for the sound of the little dumbwaiter motor being overworked. It stopped. The door opened.

Inside, a man was balanced on his head, juggling lit cherry bombs.

"Zut alors," he said. "God damn."

Callahan stepped back a pace.

The stranger fell forward, twisting as he fell so that he landed on his feet in front of the big barkeep, still juggling. As Mike opened his mouth, the hypnotic circle of burning fireworks opened out into a long arc whose terminus was the fireplace. All four cherry bombs exploded therein with a stupendous concussion. Broken glass sprayed outward, miraculously arranging itself on the floor to spell out the word "AL."

The stranger vaulted the bar at once and cartwheeled into the middle of the room, people scattering frantically out of his way. He landed lightly on his feet and beamed.

"Phee is the name," he cried merrily, "Al Phee, and the first one who asks me what it's all about gets a boot in the plums. Phee's my name and commission's my game—gather round like cattle and you shall be herd. I bring you the bazaar of the bizarre, the genuine Universal Pantechnicon, at a cost of just pennies! *Sacre bleu! Baise mes fesses!* Everything must go! Me stony, you savvy? Plenty bankruptcy along me."

We all stared at him.

"Come *on,"* he shouted, "look alive, get with it. This is *oportunidad muy milagrosa*—act now while this offer lasts. Step right up—who'll be the first? Oh, *faddle*—" Suddenly he fell upon the room like a whirlwind, like a big mad mosquito or a horny hummingbird. He darted through the crowd, hugging people, kissing people, shaking hands, shaking feet, tugging on beards, introducing himself to the fire extinguisher and shaking its hose, grinning like Hell's PR man and talking a mile a minute. He took a scissor from his breast pocket, clipped the end off Long-Drink McGonnigle's tie and presented it to him with a bow. He produced a white mouse from a side pocket and gave it gravely to Josie, and when she only

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smiled he burst into delighted laughter himself, lifted her hand to his lips and kissed the mouse. He stuck his face an inch away from mine, tousled my beard and patted my ass and danced away.

Eddie had been misleading: he didn't look much like Santa. He was not that heavyset, for one thing. The beard *was* more salt than pepper, but the neat short hair was weighted the other way—and the beard itself was not a Santa-type but something in between a spade and a Vandyke. I would say that he comported himself in a manner even more dapper and elegant than Gentleman John—certainly more flamboyant.

He wore a four hundred-dollar blazer over a polka-dot pajama top. He wore no trousers, and fat beaming Buddhas were printed on his shorts. He wore phosphorescent knee socks and jester's shoes with curled up toes and bells. A propellor beanie was rakishly canted over one eyebrow, the propellor spinning rapidly. The rain had not wet him. Behind wire-rim glasses, merry eyes sparkled.

About that time Long-Drink caught up with him, roaring something about his tie. Phee spun to meet him, smiled with the enormous delight of one encountering an old and dear friend, picked three glasses of whiskey from a nearby table and began to juggle them. Not a drop did he spill. Long-Drink stopped dead in his tracks and his long jaw hung down. Phee began to clap his hands rhythmically while he juggled, then slap his thighs.

Without taking his eyes from the glasses, the Drink felt for his tie, yanked it from his neck and tramped it into the sawdust.

Phee backed away, still juggling and clapping, until he was back in the center of the room where he had started. Suddenly the glasses were all upside down in their stately circle, their contents in motion. Each cataract ended up in Phee's mouth, and his beard was dry when he finished.

His cyclone passage among us had shattered our group stasis—the room was filled with the *rooba-rooba* of many people talking at once. When the last of the three empty glasses hit the hearth, and the fragments had spelled "PHEE" next to the "AL," the murmur became a standing ovation.

"Mister," Long-Drink said, "that was the best goddam juggling I ever saw in my life."

Phee smiled indulgently, shook his head. "You haven't lived until you've seen it done with chainsaws. Eek! Heavy, baby."

Eddie spoke for all of us. "What de hell is goin' on?"

"Mutual introductions, of course. I am Al Phee, and you are, in order," he ticked us off, "Marshall Artz, Boyle Deggs, Tom Foolery, Rachel Prejudice, Dee Jenrette, Miss Fortune," (pointing at Josie) "Fleming Ayniss, Manny Peeples, and Euell P. Yorpantz. Now that we know *who* we are, we may consider *what* we are: *c'est simple, non?* Shitfire, and dog

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my cats. I am a yoofo," he declared.

"A which?"

"Not a foe of you, but a U.F.O. And you are all Hugos. Unidentified goggling objects. What's wrong with you imbeciles *ce soir,* don't you see? *Ding an sich:* I am from outer space."

"In a sleigh?" Callahan asked.

"We used to make 'em look like dishware, but believe it or not, that wasn't silly enough—people who saw us kept *reporting* it. *Nobody* reports a sleigh and eight tiny reindeer."

I think Phee expected this announcement to be the most stunning so far. If so, he was disappointed. Long-Drink nodded and said, "Sure, that explains it," and there was a general air of *de*mystification everywhere. I wished that Mickey Finn were around that night. Finn is an extraterrestrial himself, and I wondered what he would think of this guy. But of course it was summer, and Finn was way up north on the Gaspé Peninsula, tending his farm.

"So what can we do for you?" Callahan asked imperturbably.

"What's a pantechnicon?" I added.

If he was disappointed at our collective sangfroid, Phee hid it well. *"Merde d'une puce,"* he exclaimed, eyes flashing, "don't you know your own language?" He had one of the loudest voices I'd ever heard.

"Furniture warehouse," Gentleman John put in.

"Correct," Phee admitted, "but not the meaning I meaning."

"Oh, you must mean the nineteenth century bazaars in London," John said, light dawning.

"—where arts and crafts were sold, yes," Phee said, applauding silently. "B plus. Pan plus technikos—*comme j'ai dit,* a bazaar of the bizarre."

Callahan's eyes widened. "Do you mean to tell me—?" he began, teeth clenched on his cigar.

Phee smiled like a flashbulb going off. *"Exactement,* my large. I am an Intergalactic Traveling Salesman."

People began to giggle, then laugh outright, then guffaw. Folks folded at the middle, slapped their thighs, pounded on tables with their fists, met each other's eyes and laughed anew. Even Callahan roared with gargantuan mirth, clapping his big knuckly hands together. Phee might have been excused for thinking we doubted his story—but I could see through my own tears of mirth that, after a moment's annoyance, he understood. Somehow he knew that our laughter was not derision but delight.

It's like I said earlier, when you've been hanging out at Callahan's bar a while, you begin to see a zany kind of symmetry to the way things happen there. "Hannibal's Holy Hairpiece, it's perfect!" Long-Drink crowed. "A traveling salesman has flown into Callahan's on Tall Tales Night. Sell my clothes, I'm gone to heaven!"

Phee bowed. "No fear? Marvelous; I impress. Hot damn. It is a business doing pleasure with you. I was told by blackguards that you did not civilize yet. Lies, by jiminy!"

"It just come on recent," Doc Webster said, and broke up again.

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Phee waited politely until we were all finished. Then he produced a burning cigarette from out of thin air, flipped it into his face, and began chewing on the filter. "To business we then progress, *jawohl*? Groovey. Innkeeper, *gib mir Getränk*—a flagon of firewater. Darn the torpedoes. Gosh."

Callahan poured whiskey and passed it across the bar. "How come no sample cases, brother? What's your line?"

"Oh, but I have a sample case, sweetheart. *Mais oui.*" He reached into the inside pocket of his blazer and removed a hole. It had no edges, no boundaries, and it was no color at all. It was just...a *hole,* about the size of the lid on a half gallon of ice cream. He held it by the edge it didn't have, extended it to arm's length, and when he dropped his hand it stayed there, a circle of *nothing.*

There were whistles and much awed murmuring.

"Nonsense," Phee said airily, "is *nothing* sacred? *Voila le* sample case."

"Say," Long-Drink began, "how many of those would you think it'd take to fill the Alb—*ouch*!" He glared at Doc Webster and began rubbing his shin.

"No, *compadres,*" Phee said, "it is not a hole-o-graph. It is a hyperpocket, a dimensional bridge to a...ahem... pocket universe. *Regardez!*"

He reached an elegantly manicured hand into the hole, and the hand failed to reappear on the other side. "*Pardon,*" he muttered, rummaging. "Ah!" His hand emerged. It was holding, by the throat, an extremely long-necked dragon, whose scaled head had barely fit through the hole. Reptilian eyes regarded us coldly, the fanged jaws opened, and a gout of flame set Phee's hair on fire.

"Damn," he said irritably, "wrong drawer. One of these days I'm going to get this office organized." He thrust the dragon's head back into the hole with an air of embarrassment. He ignored the fire on his head, and it seemed impolite to mention it, so it burned undisturbed as he rummaged, until his scalp was covered with black smoldering curls. The beanie was unaffected. "*Boñiga del mestizo enano*...aha! *Now* see."

People edged discreetly away, and he pulled out a vaguely spherical object wrapped in soft cloth. He yanked on a corner of the cloth, and the object flew sparkling into the air; he caught it with the other hand. My first crazy thought was: "burning ice."

"My line," he said triumphantly. "Jewels."

It looked something like a cut diamond the size of a softball, at least in physical structure. It was symmetrically faceted, very nearly transparent, and contained within it, like flies trapped in amber, perhaps a dozen splashes and streaks of liquid color, unbearably pure and lambent. The colors and shapes harmonized. It was so beautiful it hurt to look at.

"Is there anyone here who is chronically worried?" Phee asked.

Slippery Joe Maser stepped forward. "I got two wives."

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"Splendid! *Kommen sie her.*"

Joe hung back.

"Umgawa," Phee rapped impatiently. "Don't be such a chickenshit. Four centuries on the road this trip, and I haven't lost a customer yet. Come on, be a *mensch.*"

Joe approached uneasily.

"You *are* a worrier. Lucky I was passing by. Catch!"

He tossed the gleaming jewel to Joe, who caught it awkwardly in both hands. He stared down at the thing for a long moment.

"What do you worry about most?" Phee asked. "No, *mon vieil asperge,* don't tell me—just think about it."

Joe closed his eyes and thought about it.

From the places where his fingertips touched the jewel, streamers of a grey, milky substance began to infuse it, like milk being poured into a glass of weak tea from several points at once. Soon the entire interior of the gem was swirling grey, all the splatters of aching color hidden.

I tore my eyes from it to look at Joe. His face shone with the light that was obscured now in the jewel. Every feature was relaxed; for the first time since I've known him, his forehead was utterly smooth, no more wrinkles than a Gothic novel.

His eyes opened. "What the hell was I worryin' about?" he breathed contentedly. He worked his shoulders like a man who has just set down, at long last, a crushing burden. "What's to worry?"

Callahan's voice was shockingly harsh. "Is that thing addictive?"

"Nyet," Phee responded at once. *"Au contraire.* Watch."

Joe was looking at the greywashed jewel in his hands, and his expression was mournful. "Geeze," he said sadly, "did *I* do that?"

"You see?" Phee said smugly. "To despoil such a loveliness is ashaming: the *sahib* feels like a jerk. The more he uses it, the more he is conditioned not to generate worry in the first place. *Bojemoi.* One's self-indulgence is less tolerable when it is made visible as dung on a diamond, *n'est-ce pas?"*

"What's de t'ing cost?" Fast Eddie asked.

"Just pennies, I told you," Phee said, rummaging in his hyperpocket again. "Now this little sucker here is even more amazing, calculated to breed greed and fully warranteed." He produced and unwrapped a second jewel. It was similar to the first, but tinted rather than clear. The tint was the blue of a tropic lagoon before the white man came, restful to contemplate. Within it were not color impurities this time, but tiny angels. Miniature aleate females, the size of fireflies and correctly scaled. Somehow they flew slowly and gracefully to and fro within the jewel, as though it were filled with viscous fluid instead of being solid. It made my eyes sting.

"Is anyone here particularly angry?" Phee inquired.

Gentleman John looked at Josie—who was watching Phee with rapt attention—and then at me. "Well," he said,

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"I'm not *generally* angry, but I suppose I am *particularly* angry. This bleeder here wrecked a perfectly good pun."

"I heard, from on high," Phee agreed sympathetically. "Monstrous. Insupportable. Tough shit. *Venez ici.*"

John took the jewel from him, glanced again at me, murmured, "Rat bastard," and closed his eyes.

The jewel began to suffuse with red. The tiny angels tried unsuccessfully to avoid the red, and where it touched them it congealed like quick-setting Jell-O, imprisoning them. Soon they were invisible, and the jewel was an angry scarlet. People gasped.

John opened his eyes, blinked at the thing, and slumped. "What a vile thing anger is," he said bitterly. "I'm truly sorry, Jake." He smiled then. "Glad to be shut of it, though."

"Both jewels will clear again within an hour," Phee said brightly. "With real rage, this one becomes uncomfortably hot to the touch, in proportion to the strength of the fury. Both may be used repeatedly at hourly intervals, and will never wear out or malfunction. The Tsuris Trap and the Rage-Assuager, available only from your pal Al, *votre ami* Phee. *Sanitario y no adictivo—*"

"*¿Cuánto?*" Eddie said. "I mean, how *much?*"

"*C'est absurdité ou surdité,*" Phee frowned. "I already *told* you, ducks: just *pennies! Fritz du Leiber,* twenty-three skiddoo! But you ain't seen *nothin'* yet." He looked at the hyperpocket. "Well, perhaps you have—but the best is yet to come, as the bishop said to the actress. Behold, deholed."

He produced a third jewel, and this one was untinted and contained hundreds of tiny beads of every color in the rainbow, writhing like kittens beneath the scintillant surface. It...wept music as he touched it, little plaintive chords and arpeggios.

"You," he said pointing at me. "You say you play a guitar. Your face is furry, your hair abundant. You have experience of hallucinogens, *sí?*"

"So?"

"*Ça.*" He tossed me the jewel.

Phantasms flickered briefly around the room as I caught it, little not-quite-seen things. My fingers tingled where they touched it.

"Think of a piece of music," Phee commanded. "Any music that you love."

I picked the first thing that came into my head. Suddenly the room filled with the sound of lush strings. I jumped and they were gone.

"Again," Phee directed. "Roll 'em, baby."

The strings returned, and when they had finished their simple eight-chord prelude, Brother Ray sang, "*Georgia...*"

People sat back and smiled all over Callahan's bar.

At first it was precisely like the definitive recording that everybody knows—right down to the crackle-pop surface noise of the treasured copy I own. It skipped in the same place. That told me where it was coming from, so I experimented. I have never willingly missed an opportunity to

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record a Ray Charles TV performance, and I have eleven different versions of "Georgia On My Mind." I concentrated, and Ray suddenly slipped smoothly into the extended bridge he has been using the last few years, where the band and the drummer just go away and let him play with it for awhile. The surface noise vanished; fidelity became perfect. When the bridge was over he segued back into the original without a seam, and murmurs of appreciation came from Fast Eddie and a few others.

I glanced down at the jewel, and it seemed that all the glowing beads vanished a quarter-second after my eyes touched it. There was a collective gasp, and I looked up and The Genius himself was sitting at Eddie's beat-up piano, big black glasses and the whitest teeth God ever made, rocking from side to side in that distinctive way and caressing the keys, singing "Georgia On My Mind" for the patrons of Callahan's Place.

His finish was fabulous. I'm proud to say it was not one he has ever, to my knowledge, recorded.

As the applause died down, he modulated from G down to E and began the opening bass riff of "What'd I Say?" The original Raylettes and Marjorie Hendricks appeared next to the piano. I shivered like a dog and threw the jewel at Phee, and artists and music vanished.

"Don't get me started," I said. "But thank you from the bottom of my heart. All my life I've wanted to do that. What *is* that thing?"

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Phee did not reply, but suddenly there was a flourish of trumpets and the word "VISUALIZER" was spelled out in the air in letters of cool fire, like neon without tubes, rippling in random air currents. They flared and bisected, wedged apart by a new group of letters all in gold, so that the new construct read: "VISUAL(SYNTHES)IZER." It flared again, and the parenthetical intruder departed once more.

" 'Synthes,' you've gone..." Phee sang, and Josie giggled. "It's a dream machine, dear boy. A hallucinator. Anything you can imagine, it gives auditory and visual substance to. *Je regrette* that at the present state of the art I cannot give you tactile—*but,* if you act *muy pronto* and because I like your face, I'm prepared to throw in

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olfactory for *not a dime extra.* Freebie, *kapish?"*

Make no mistake: I wanted that thing. But I reacted instinctively, with the reflex-response of a Long Islander to high-pressure sales tactics. "I don't know..."

"Schlep. Do you *know* what the olfactory mode can *do* for the porn fantasies alone?"

Eddie stared at his now-empty piano stool and shook his head. "How much?" he asked again.

Exasperated, Phee danced to the bar, grabbed up a funnel and took it back to Eddie. He stuck the business end in Eddie's left ear. "JUST PENNIES," he bellowed into it. "I'm telling you," he continued conversationally to the rest of us, "it's a steal. Good for fifteen minutes' use every four hours, an optional headphone effect for apartment use, and there's a fail-safe device that blows the breaker if you use it to scare people. Hoyoto! *Banzai!* Barkeep, more grog!"

"You ain't paid for the last one yet," Callahan said reasonably.

"Did I hear right through the roof earlier? On *ce soir* the teller of the tallest tale drinks *gratis?"*

"That's so," Callahan admitted.

Josie cleared her throat. "There's ...another advantage."

Phee looked gallantly attentive.

She turned red. "Oh hell." She went up and whispered in his ear. His left eyebrow rose high, and the propeller beanie doubled its RPM.

"Hoo ha," he stated.

Josie looked around at us. "Well, it's just...I guess I'm grateful for a good laugh. Maybe it's an Oedipal thing: my Dad is a brilliant jokester. And—and funny men are nicer lovers. They know about pain."

Phee then bowed magnificently. *"Mademoiselle,"* he said reverently, "you are clearly the product of an advanced civilization. Furthermore you are spathic. Geologists' term: 'having good cleavage.' *Alors,* correct me if I now err: a truly great tall tale must, first, be a true story—or at least one which cannot be disproved. Second, it must be gonzo, *phweet!,* wacky, Jack. Third, it should conclude with a pun of surpassing atrocity, *nicht wahr?"*

There was murmured agreement all around. Folks ordered drinks and settled back in their chairs.

"Right. Dig it: a true story. I have witnessed this personally from my spacecraft, and am prepared to document it. The toilet tanks on your commercial airliners often leak. This results in the formation of deposits of blue ice on the fuselage. The ice is composed of feces, urine, and blue liquid disinfectant. Now: occasionally, when a plane must descend very rapidly from a great height, especially near the Rocky Mountains, chunks of blue ice ranging up to two hundred pounds can—and *do*—break off and shell the countryside. *This is the truth,"* he cried, as we began giggling. "I have seen a UPI photo of an apartment in Denver which was pulped by a one hundred and fifty pound chunk of blue ice. The airline

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bought the tenants a house—and the landlord a judge."

People were laughing helplessly, and Gentleman John's face was so red I thought he'd burst. "My God," he howled, "can you imagine them *checking in at hospital?* 'Cause of injury, please?' " He caved in.

"Neither of them were hurt," Phee said. "And for a while—until it began to thaw—they were grateful for the coolness it provided. It was summer, you see, and the impact had destroyed their electric fan..."

Callahan was laughing so hard his apron ripped. Doc Webster lay on his back on the floor, kicking his feet. Long-Drink laughed his bridgework loose.

"So," Phee concluded, sitting down on thin air and crossing his legs, "even if you live where there are no strategic military targets, you can still be attacked by an icy B.M."

Instant silence. A stunned, shuddering intake of breath, and then—the only group scream I have ever heard, a deafening howl of anguish insupportable. Somewhichway it turned, before it was done, into a standing ovation, and a barrage of glasses hit the fireplace. Josie ran over and hopped on Phee's lap, renewing the applause. John and I beat our palms bloody.

Callahan came around the bar with a huge grin, a bottle of Bushmill's and three glasses. He held the glasses up, raised an eyebrow inquiringly at Phee, and let go. They stayed there. He poured them full, took one and held it out. "Fee-free for Phee," he boomed. "Keep the bottle." He gave one to Josie, pulled up a chair and sat down next to the third.

Phee inclined his head in thanks. "Bless your ass. *Caramba*—is all that you? *Comment vous appelez-vous?*"

"*Je m'appelle* Mike Callahan, *señor.*"

"Sure an' Gomorrah, the saints add preservatives to us, Michael, yer a finer host than Jasus himself, and him with the free wine and all the fish you can eat. A toast, big cobber, a toast!"

"To Melba?" Callahan suggested.

"I hate Melba toasts. No. To interstellar commerce, *kemo sabe.*"

Callahan raised his glass, as did several others including myself. Oddly, Josie didn't. The toast was echoed and drunk, and the glasses were disposed of.

"What else you got for sale?" the big barkeep asked then.

"One more item," Phee said. "Excuse me, Mama." Josie shifted on his lap so he could reach the nearby hyperpocket. He took out a fourth gem. This one was pink-tinted, more translucent than transparent, and within it was a spiderweb of metallic filaments that made me think of printed circuits. He tossed it to Doc Webster.

"By the bag at your feet you are a medicine man, rotund person. Have you patients in this room?"

"All of them," the fat sawbones rumbled.

"Pick one sick one. That chap there, dear Hippo-crates. Brush him with the bauble." He pointed out Chuck

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Samms, who all too obviously had recently suffered a bad stroke: Chuck's left side was shot. The Doc frowned down at the pink jewel, and carried it to Chuck. A couple of tiny lights went on inside it as he approached.

"His thumb," Phee suggested.

The Doc looked at Chuck. "Okay?"

Half the mouth smiled. "Sure, Sam." Chuck held out his right thumb, contact was established.

The damn thing took a blood sample, flashed a few contemplative lights, and returned it. As his own blood flowed back into him, Chuck gasped, then yelped, and pushed the jewel violently away from him.

Using both hands.

He looked down at his left hand, and began to smile the first unlopsided smile he'd had in months. Doc Webster gaped at him.

"The price for all four items," Phee said, "F.O.B., shipping and handling plus applicable tax, is pennies. Literally. Every penny in this room, and nothing else."

"You mean you want all our dough?" Eddie asked.

"No, *cochon!* All your *pennies!*"

I happened to know that Mike keeps a hundred bucks in pennies in a sack under the bar—we pitch 'em on Friday nights. Still, it sounded like a hell of a deal. Stranger bargains have been made at Callahan's Place, and our sales resistance was smithereened. I started to check my pants—

"No!" Josie cried, and leaped from Phee's lap, her face white with fury.

"Why, what is it, my pigeon?" Phee asked, still sitting on nothing. "What deranges you?"

She towered over him in her wrath. "Damn it, Phee, damn you. I was going to wait until I got you home—but this is the Fourth of July, and that was the fourth jewel lie, and the lie is even more abominable than the pun. Screw you, and the reindeer you rode in on."

He blinked. "Here? Now?"

"Damn straight." She took a tube of toothpaste from the inside pocket of her vest, and before the traveling salesman could move, she had circled his knees where they crossed with a loop of toothpaste. He scrabbled at it with his fingers, and she added another loop, pinioning his hands. He began swearing fluently in several tongues—for the "toothpaste" had hardened at once into something that seemed to have the tensile strength of steel cable. Though he tried mightily, Phee could not break free. His command of obscenity was striking, and it might just have melted ordinary steel cable.

"—and may you fall into the outhouse just as a platoon of Ukrainians has finished a prune stew and six barrels of beer," he finished, and she laughed merrily.

Callahan cleared his throat. If you engage the starter on an engine that's already running, it makes a sound like that. "Josie darlin'," he began, "if you don't mind my asking—?"

"Aw, you damned fools," she burst out. "My father is right: people who don't read science fiction are the most gullible people there are. *Look at him,* for God's sake: *does he look*

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like an extraterrestrial to you?"

Josie had no way of knowing that Noah Gonzalez and I both read SF. Of course Noah works on the Fourth—he's on the County Bomb Squad. "Well," I said, "I guess we just figured his real appearance was too horrible for us to look upon. He's obviously a master of illusions."

"Too right," she snapped, and snatched the propellor beanie from Phee's head. The propellor stopped, and Phee's invisible chair was yanked out from under him. Smiling Buddhas hit the floor hard, and he howled indignantly.

We all blinked and looked around. The change was too subtle to perceive at once. All four jewels had gone opaque, and there was nothing—or rather, there *wasn't* nothing—where the hyperpocket had been, but these things took time to notice. Even when Chuck Samms cried out, the reason was not immediately apparent, for *both* sides of his mouth were turned down...

"This is the illusion-maker," Josie said, waving the beanie. "All it is is a hypnotic amplifier. The illusions are gone, now—and he still looks human. Not," she snapped, "that I claim kinship with any pride!"

"Parallel evolution?" I began.

"Don't be silly. No, *be* silly: assume he's really an alien who just happens to look human. Now explain to me why he came hundreds of light-years—past six other planets, a carload of moons and a million asteroids—to come in here and swindle you out of copper?" she asked.

There was only one possible answer, then. I opened my mouth—and then closed it. I did not, for reasons I could not define, want Josie to know that I was a science fiction reader. You're more talkative if you think your audience doesn't understand you, sometimes.

"He's a time traveler, you idiots!" she cried, confirming my guess. "Who else would need copper as desperately as your own descendants? With the couple of thousand pennies you morons were going to give him, he could have—well, quintupled his living space at the very least. And he would have left you *nothing*, except for four prop jewels and an admittedly great tall tale to tell."

Isham Latimer is Callahan's only black regular, and he knows his cue when he hears it. "Does dis mean dat de diamonds is worthless?"

Josie giggled, losing her anger all at once, and completed the quote. "Put it dis way: he is de broker, and yo' is de brok*ee*."

All the tension in the room dissolved in laughter and cheers—leaving behind a large helping of confusion.

"So what's your angle, Josie?" Callahan asked. "Where do you come in?"

"Time travel is severely proscribed," she said. "The possible consequences of tampering with the past are too horrible to contemplate."

"Sure," Callahan said. He may not be an SF reader—but all of us at Callahan's know *that* much about time

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travel. We had another time traveler in here once, who was worried considerable about that very issue—whether it was moral and/or safe to change the past of a lady he loved, to keep her from being hurt.

"And precisely because it's so tempting to 'mine the past' for all the precious things you wasted and used up on us, that is the most strictly prohibited crime on the books. Pennies are the best dodge for copper: you acquire a bunch in this era, bury them somewhere, then go back home and dig 'em up, properly aged and no way to prove it wasn't a lucky dig."

"And you—"

"Temporal agents approached my father twenty years ago, and convinced him to sign up as a kind of local way station for authorized time travelers, on a part-time basis. He's a science fiction writer—who *else* would they dare trust to understand the terrible dangers of time travel? He kept it from Mother and us kids—but about five years ago I found out. I blackmailed his employers into giving me a job on the Time Police."

"Why?" Callahan asked.

"Because it's he most *exciting* job I can think of, of course! You know my nature—I love jokes and paradoxes." She grinned. "I'm not *sure,* but I have a hunch I'm going to grow up to be Mom."

There was a stunned silence.

"So if I understand this," I said diffidently, "Phee here came for the coppers, and you came here for the coppers?"

She whooped with glee, and tossed the beanie into the fireplace. "Jake, are you busy tonight?"

I tingled from head to toe. "Aren't you?" I asked, indicating Phee.

I *knew* it was a silly question, but I didn't want her to know I knew. Aside from the most obvious benefits of her offer, as long as she didn't know I read SF there was a chance I could pump her for her father's name—and I was curious as hell.

"It won't take me any time at all to deal with him," she said. "Not yours, anyway." I made oh-of-course noises.

"What happens to *him*?" Chuck asked, and his voice was harsh.

"I'd like to cut him in half," Doc Webster said darkly. "Wouldn't be the first Phee I've split."

"He will be dealt with. Not punished—punishment accomplishes nothing. Nothing desirable, anyway. He is a brilliant man, a master hypnotist: he can be of service to his own era. He will simply be surgically implanted with a tiny device. If he ever again makes an unauthorized time-jump, he will acquire a massive and permanent case of B.O."

Chuck broke up. "Fair enough."

Phee spoke for the first time since his torrent of profanity. "I apologize, sir, for what I did to you. That lie *was* the cruelest—and perhaps unnecessary. I...I never *could* resist a good dazzle." He shook his head. "I'm sorry," he repeated.

Chuck was taken aback. The half of his face that could hold expression

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softened. "Well...it *was* kind of nice to be whole again there for a minute. I dunno; maybe the havin' of that minute was worth the losin' of it. I'm sorry I laughed at you, mister."

Sitting there in his shorts on the floor with his hands toothpasted to his knees, Phee managed to bow.

"I don't get it," Long-Drink complained. "If this guy wanted pennies, why not just time-travel into a bank vault and take a *million* of 'em? Why go through all this rigamarole?"

Phee looked elegantly pained. "What would be the *fun* in that? That's the only thing about being busted that really bothers me: she was here waiting for me. I *hate* being predictable."

"Don't feel bad," Josie told him. "You couldn't have known. This place is a probability nexus. Why, this was the *priori* terminus for the first-ever time-jump."

Why sure—when I thought about it, our previous time traveler's brother had *invented* the first time machine. His had been a bulky belt—these people were more advanced.

Phee's eyes widened. He stared around at us. "By Crom, I'm impressed. What did you do?"

"We took up a collection for him," Eddie answered truthfully.

Phee shook his head. "And I took you for yokels. Take me away, officer."

In a way it was a little saddening to see the great Al Phee bestered.

Josie picked him up effortlessly and slung him over her shoulder. With her free hand, she reached into the purse that hung from her shoulder.

"Uh," I said, and she paused. "You'll be right back?"

She grimaced. "Soon for you. Not for me. I'll be back as quick as I can, Jake—honest! But first I've got to take him in and make out the report and do all the paperwork, and then I promised Dad I'd drop in on him for a quick visit about twenty years from now. But I'll be back before you know it."

"Why twenty years from now?"

"I hate to bother him when he's working. By then he should be done with the Riverworld ser—" She broke off. "I'll be right back," she said shortly, and fumbled in the purse. She and Phee vanished.

And I fell down howling on the floor.

What made it twice as funny was that my ethics forbade me to share the joke with everybody else—I don't think I could have stopped laughing long enough, anyhow. Gentleman John almost killed me when he understood I wasn't going to explain it.

But hell, it was so obvious! I shouldn't have needed that last hint. I didn't even need to know enough German to know what "Bauer" means. I *know* that there's a kind of delirious logic to the way things happen at Callahan's Place, a kind of artistic symmetry.

So if a traveling salesman comes into Callahan's Bar on Tall Tales Night—whose daughter is going to turn out to be his downfall?■

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BROECK STEADMAN

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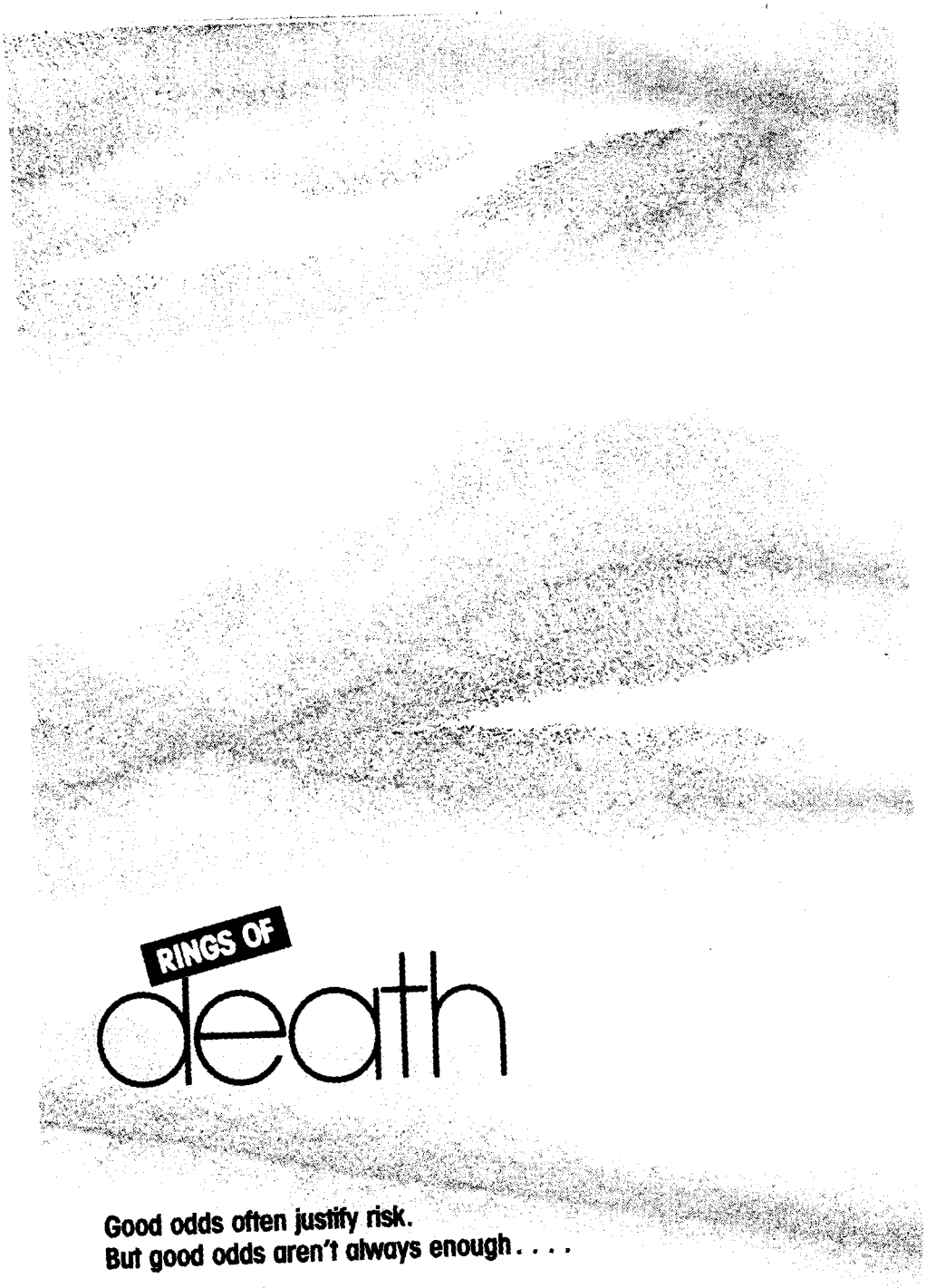

Good odds often justify risk.
But good odds aren't always enough. . . .

PAUL J. NAHIN

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I got a Christmas card from Rod Jackson last week. The letter that came in the same mail cleared up a lot of questions for me—the whole affair had seemed rather odd right from the start. I really knew something was queer though when I visited him a couple of weeks ago. But the letter straightened it all out. I wish to hell he hadn't sent it.

Maybe you'd recognize the name better if I said: *Dr. Rodney W. Jackson, Special Consultant to the Office of the Secretary of Defense.* Ah, *that* rings a bell, doesn't it? Thought it would.

Sure, he's the fellow who was in the news regularly until about a year ago. The *Post* or the *Globe* or the *Times* seemed to be always carrying an article with his by-line, or an interview on his thoughts about some scientific-military question. He was on a lot of television talk shows, too, and *Meet the Press* had him on seven times in three years. Rod was our top scientific R&D technologist, a double Ph.D. in math and physics, and a genius in chemistry, rocketry and electronics to boot. He was personable, besides, and didn't come across like a weirdo egghead in a white lab coat. The generals and admirals liked him, Congress loved him when he gave committee testimony, and the general public trusted him. He was a regular guy, who happened to be awfully damn brilliant.

And then his star over the Pentagon set. Within a month he was through, run out to pasture as a math prof in a little college in upstate Vermont. His influence, power, and public visibility were gone in a twinkling, just like the bright picture on a TV screen when the power's snapped off.

I've kept in touch with Rod over the years—we were roommates at Stanford as undergraduates. It was extremely difficult to actually see him during the years he was off in Washington, of course, but I always got a Christmas card. And every now and then, even a short letter. Rod and I were pals at Stanford, and he's a loyal guy. He didn't let the fame go to his head. Besides, I married his sister, Susan.

After graduation, I went off to Caltech for grad school, Rod disappeared into the Eastern establishment of Harvard, the Lincoln Labs at MIT, and summer research in military electronics at the Rome Air Development Center at Griffiss AFB in New York State. I saw him a couple of times when he came home for visits (I was courting Susan by then), and then, for the last time until a couple of weeks ago, at my wedding. After that, it was just the yearly Christmas card, and occasional short note. After I married Susan, we wound up at Lawrence Livermore Labs where I design nuclear weapons and all sorts of other top secret hush-hush stuff. But nothing like what got Rod into trouble.

We were all proud of Rod, as the years passed and his reputation grew. But then, like I said, it all came to an end. Susan and I didn't even know Rod was in Vermont until he wrote and told us he was already there.

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Susan convinced me something wasn't right, and that a telephone call or letter wouldn't be enough, and that we should fly back and visit with him. What the heck, it *was* mid-December, and a visit back East to snow country seemed like fun, so we grabbed a flight and went.

It was scary, in a subtle sort of way. Rod was pleasant enough, but he wasn't the Rod I remembered. Oh, he was witty and charming, and as far as I could tell, as brilliant as ever. But it was forced. And there was a furtive, 'looking over the shoulder' behavior about him. He absolutely refused to discuss his departure from Washington, and after we had talked ourselves out about the family, well, there really wasn't anything left to say. We left, with me plenty disturbed, and Susan just plain upset. She saw the signs of change, too.

I guess I said some pretty rash things on the flight home, but only succeeded in disturbing Susan even more. A week later Rod's letter and card came. I haven't destroyed the letter yet, but even after I do I'll still never forget it. I keep trying to, but I can't!

Here, read it for yourself.

December 17

Dear John,

I've decided to write this letter because I'm afraid you're about to get yourself in more trouble than you can imagine. Susan called to tell me that you are going to openly raise the issue of my dismissal, and demand an investigation. Don't! We'll both be 'eliminated,' John, of that I'm absolutely certain. Even with my silence, I'm not sure of my 'safety,' such as it is.

I know my behavior during your recent visit was disturbing, but I'm *not* paranoid. I'm taking a big chance even writing this to you—those damn spooks stick their Pinocchio noses into *everything*—but I believe I know you well enough to risk you'll do nothing foolish, once you know the whole story. When you're done reading this, destroy it!, for both our sakes. And Susan's.

It all began innocently enough. About ten years ago I attended a top secret CIA meeting at Langley on the use of computers and trapdoor codes to encrypt sensitive messages. It was the usual collection of cloak and dagger spooks, and ivory tower specialists. Incredibly nonproductive. I didn't usually fool around with those guys, but I was 'asked' to attend by the Secretary himself. You don't turn the Old Man down. As I was leaving, I got into a discussion with an old naval officer (he landed at Inchon with MacArthur!) who really had it in for R&D work that wouldn't produce a working weapon within sixty days. (Those were the heydays of Senator Proxmire, and you certainly must recall what a Neanderthal *he* was on pure research!) As we rode down in the elevator, he said something that was so dumb I couldn't let it pass. "You know, young fella, you damn scientists are taking all the humanity out of warfare, what with your theoretical research, paper analyses, and

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feasibility studies. What matters is body counts, and you get those with hot lead. Not cold paper!"

That really set me off, and I launched into a speech on the historical evidence overwhelmingly in support of the value of research for research—the weapons technology will follow automatically. Then I started the whole mess. In a rather pompous voice, I stated that even the esoteric field of black hole physics had a real, down-to-earth military application. In fact, blue-sky paper and pencil stuff could build us the ultimate weapon! The old salt perked up at that, of course, and he challenged me to put up, or shut up. So, like a damn fool, I went home, wrote it all out, and sent it to him. Never heard from him again, and forgot about it—I didn't *really* believe he'd do anything with it, and I guess I didn't *really* believe it would work, anyway. But it does. It works only too well!

You're a nuclear weapons designer, John, and you'll pick up the basic ideas fast. So here it is. For a long time it was believed black holes are permanent fixtures of the universe, created at Big Bang time, and here to stay ever since. Doing nothing but getting bigger by occasionally swallowing passing hunks of matter, like a planet or a star. But then Hawking showed how black holes could, in fact, literally die by 'bleeding to death' through vacuum fluctuations. The near space around a black hole, even just outside its Schwarzchild event horizon, is monstrously twisted with gravitational stress, and the field energy is huge. Hawking showed how part of this energy, even in a vacuum, is always partially revealing itself as matter in the form of pair production of particles and their antiparticles. Most of the time the two kinds of particles just recombine and annihilate each other in bursts of pure energy that go back into the field. But every now and then, some of the particles escape from the hole, taking energy with them. Eventually, the event horizon shrinks until the black hole becomes a white hole, and gushes energy *outward.* All the mini-black holes created in the Beginning have disappeared just that way, with only the really massive ones still around.

Well, John, what I wrote to that officer was just the idea of creating a local energy field in a vacuum *on Earth* with a huge density and *purposely* siphoning off the antimatter part of the particle pair fluctuations. I figured antiprotons would be the best bet, after some calculations on the creation rates. It was simplicity itself! My God, John, as I think about it now it still almost knocks me over, it's so damn bloody *easy* to do! All you have to do, once you've got the antimatter particles out of the field, is to put them 'into storage' by injecting them into a strong magnetic field where they go into circular orbits.

Oh, sure, there're all *kinds* of engineering problems. But conceptually their solutions are easy. The ultra-high energy density field could be generated through the use of elec-

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trostatic fields with enormous potential gradients. Hell, the manufacturers of capacitors have been doing that for decades. The magnetic field to curve the antimatter into orbit could be produced with huge currents in superconductive lead coils. The stability of the antimatter rings could be assured with the theory and practical techniques *already* worked out for fusion reactors. Orbit decay from energy radiation caused by the acceleration inherent in circular paths could be compensated for with radio-frequency sustainer fields. The cyclotron boys have had that technique down solid for years. And so on with all the other problems I could foresee—I had answers for all those questions.

Do you see it now, John? A ring storage unit would be an antimatter bomb! Just turn off the magnetic confinement field, and the antiparticle ring would disperse from the Coulomb repulsion force between similarly charged particles, and annihilate itself when it reached the vacuum chamber walls of ordinary matter. It'd be the perfect "clean" bomb, with absolutely no radioactive residue. Nothing but pure, clean energy, at one-hundred percent efficiency. It makes the 'clean' neutron bomb look like a mud ball.

Unknown to me (I *swear* I didn't know until last year), the spooks went ahead and implemented the scheme! All over the U.S., those bastards put

IN TIMES TO COME

In the Four Corners region of the southwestern United States lived the Amerindian culture of the Anasazi. Their descendants live on, known today as the Pueblos and preserving much of the original mythos, such as the *Ogre Kachina* still feared by Pueblo children. But the Anasazi cliff dwellings stand empty, suddenly and mysteriously abandoned centuries ago. Dean Ing's two-part serial *Anasazi,* which begins in our July issue, just may explain the many mysteries surrounding that lost culture, as well as being a rousing and memorable tale. Dean knows that land and its people, and from both personal familiarity and a vast amount of painstaking research he has woven a wealth of authentic fact and some highly imaginative speculation into a fabric so tight you'll be hard put to tell which is which—and you may be left with the disquieting suspicion that this may not be fiction at all. You'll recognize two of the characters, Val Clarke and Laura Dunning, from an early story of Dean's ("Devil You Don't Know"), but having read that is certainly not a prerequisite. The cover is by Broeck Steadman, making his debut in that capacity.

Margaret L. Silbar is back in the fact article slot, with a piece on "Quark Stars," about the role that one of the stranger speculations of modern elementary particle physics may play in astronomy. Plus a diverse assortment of stories and features.

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antiparticle storage rings into operation. Christ, when you've got a ten billion-dollar budget, what do you *do* with it all!? So they built the rings. Month after month, year after year, soaking up antimatter. When I found out, I was furious. The fools don't know what they're doing, John! It's just too damn dangerous, and I refused to cooperate, to lend my name in selling the rings as 'the weapon that would make World War III impossible.' They were going to threaten to use them as 'super bombs.' When I was forced to resign—I made myself too big a pest—each of the rings had enough antimatter in it to boil the better part of a cubic mile of the Atlantic. You know the specific heat of water, John, and I'll let you figure out how many megatons of energy *that* takes. Just turn the magnetic field off though, and—poof! Part of a whole damn ocean boils away!

I don't know exactly how many there are, or construction details, but I estimate at least five, spread pretty uniformly over the contiguous U.S. It was just a joke, John, a damn silly joke. But the Lord have mercy on my soul, I never thought they'd do it.

Well, that's a pretty scary letter all right, but still, something about it didn't ring solid. After all, I'm a weapons designer myself, and what really worries me about what *I* do is precisely all that dirty fallout. Rod's antimatter bomb does away with that, with nothing but a lot of transient gamma rays and a damn big blast.

And that's good! That's a description of the *perfect* counter-force weapon, without any of the fallout, anti-population threat that helps destabilize the political situation between the major military powers. So that's what puzzled me, you see—*why* was Rod so upset, enough to ruin his career? I didn't doubt what Rod had written—just that he hadn't told me *everything*. Maybe he figured he'd said enough to frighten me off, and anything more would just put me in danger. I couldn't figure it out.

Now I know, and God help us all.

Two days after getting the letter and hesitant to pursue Rod about the confusion he'd raised in my mind, considering the obvious stress he was under, I 'arranged' a discussion with one of our bright, new young Ph. D.'s at the Lab. You know, one of those over the lunch table, equations scribbled on a napkin bull sessions that physicists and electrical engineers love so much. I planned to innocently steer that conversation around to the antimatter bomb concept.

The young fellow whose brain I decided to pick was Rich Poloski. A big, burly guy, with a body like an ape, his outward appearance is that of a steelworker whose idea of a deep intellectual exercise is reading a restaurant menu. But his brain is that of a first-rate theoretician. The kind of mind you might expect to find in a Caltech Ph. D. who had recently written a doctoral dissertation on the quantization of the gravity field. A paper that had brought him instant

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world-wide notice and respect. That's a pretty fair description of Rich, and it was a real coup for the Lab to have him join the staff.

There were five or six of us at the start of lunch, but one by one, the others drifted off, back to work. Finally, it was just Rich and me, and as he started to excuse himself, I stopped him.

"Rich, give me a few minutes of your time, will you? I've got an idea I want to run by a bright guy like you, and I want you to tear what I say apart, show me the loopholes—OK?"

He sat down, and looked pleased. "Sure, John, shoot away. What the heck, you're my section chief, so I've got automatic permission to take a long lunch hour, right!?"

We both chuckled at that, and I let the feeling of relaxation last while I lit my pipe and took a few puffs. Then I got serious. "Rich, let me get down to brass tacks, right away. I've got a scheme for a new weapon, a *wild* scheme, and I need your evaluation." Rich remained silent, waiting for me to continue. I quickly outlined the concept of the antimatter bomb, and watched his expression change from that of helpful interest to surprise. When I finished he stared at me.

"John, let me put my cards right on the table. Is this some sort of security test? I mean, this is the second time *in two months* that I've been approached about this!"

Now it was my turn to stare. "What! *Who* approached you?"

"A CIA representative. They wanted me to do some calculations on the stability of the particle rings, using the quantum-gravity approach I'd developed in my dissertation. He was very casual about it, but they did want me to abstain from publishing anything about it. They put me on a short-term consulting contract, and I did the analysis for them, free-lance. Only took me a couple of days." Rich's face took a worried turn. "Jesus, John, that's not the problem, is it? I mean, as far as the Lab is concerned? You know, Janet and I are expecting our first child in three months, and we sure needed the extra money, and it *was* for the U.S. government. I figured it *had* to be all right!"

It was clear enough—Rod's former employers had gone out for a second opinion!

"No, no, don't worry about *that,* Rich. It's no big thing, although you probably should have mentioned it to me. But that's in the past. Look, you said they wanted you to study the ring stability. Are you talking about the possibility of a power failure in the actual magnetic confinement field?"

"No, that part's easy. They said a back-up emergency unit of storage batteries could keep a ring powered-up for days if they should ever lose commercial power during a blackout. Oh, there was a bit of a question about the minimum switching time from the primary power to the battery back-up, but that's easy, too. They'd just run the primary power in parallel with the batteries, like the alternator/battery/voltage regulator arrangement in

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a car. That way, there's *zero* switching time and a ring could ride through a power failure, easy. No, *that's* no problem. It's something else."

I took a couple of puffs on my pipe, and blew a smoke ring. As we watched it expand and dissipate, Rich said, "*That's* the problem, John. The 'smoke ring' effect, for lack of a better expression. Your smoke rings are blown apart by the air currents in the room, *and* the random velocities of the smoke particles when you expel them from your mouth. There's no air current effect for the particle rings, of course, because they're in a vacuum. But there is the random velocity effect. That's where my quantum-gravity theory comes in—in effect, there's an uncertainty phenomenon that appears in the equations that shows there is a non-zero probability that such a particle ring can *spontaneously* expand and dissipate. Of course, that's just an unexciting way of saying the bomb prematurely explodes!"

I was beginning to comprehend what Rod was *really* worried about. Had he anticipated Rich's quantum-gravity work, possibly discovering the smoke ring effect for himself? I tried to keep my fears to myself.

"Well, then, what did the CIA fellows say when you told them that?"

"You know, John, that *was* strange. I worked out the probability of such a catastrophic occurrence—it's very insensitive to the ring current, once you get above a threshold that's less than what they told me a fully charged ring would be operated at. Comes out to be about one chance in three thousand that a ring will self-destruct sometime over a year's interval." Rich pulled a pocket calculator out and punched in the numbers. "More precisely, the probability the ring *wouldn't* detonate in a given year is two thousand, nine hundred ninety-nine over three thousand, or 0.9997. That's pretty reliable, but still a *long* way from a negligible risk. I thought they'd be interested in that, but actually, they didn't really have *any* reaction.

"Anyway, *then* they asked me to work out the probability a *group* of rings would self-destruct. What I mean is, if you had K rings, what's the chance at least one of them would blow sometime over the next N years. They wanted me to work it out as a function of the variables K and N. Well, John, you know that's a standard type of problem in a first course on probability theory. I just wrote it right out for them."

Rich grabbed a napkin on the table and scribbled down the equation. "If P is the probability of spontaneous detonation by at least one ring, then of course we have:

$$P = 1 - (2{,}999/3{,}000)^{NK}$$

"I asked them what values of N and K they had in mind. They said, just to pick numbers out of the air, to plug in N equal to twenty years, and K equal to five rings." Rich punched in the numbers again and said, "That works out to be 0.0327, or say, thirty-three chances out of a thousand that at least one ring would blow over a twenty-year period."

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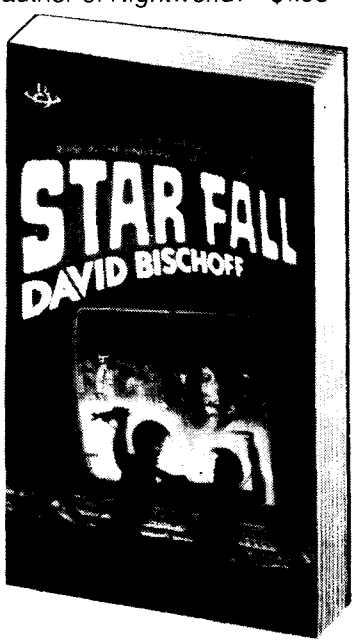

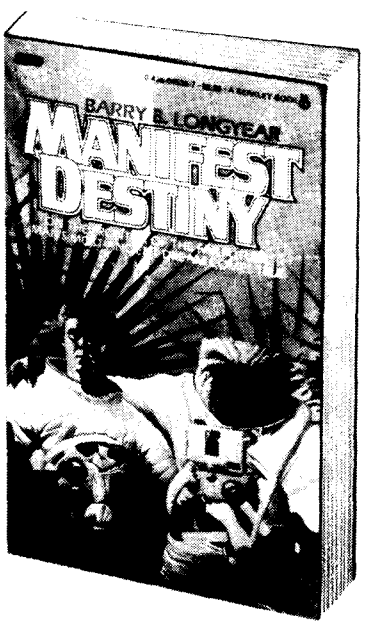

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"Yes, yes," I replied, a little impatiently, "go on!"

"Well, that's all there is. I wasn't actually *talking* to anyone when I did the calculations, you see. I just wrote it all up, and sent my report to them. Got my consulting fee in the return mail, very promptly, and that's it. I've had no further contact with them. I figure that once they saw those numbers, they realized the danger in building a lot of rings." Rich punched in some more numbers. "Actually, over twenty years, even one ring, all by itself, has almost seven chances in a thousand of blowing. Too risky, I'd say."

"No, Rich, you're wrong. For the government, those numbers might sound pretty good!"

"What do you mean?! Jesus, would *you* take a chance on those odds?"

"Me? Nope. But think back—remember the Skylab incident in '79? NASA figured the odds of someone getting killed by the reentry debris at one in a hundred fifty, said that was perfectly acceptable! The numbers you just gave me on spontaneous ring detonation are even less chancy. Or take a look at the risks the biological boys have been running for *decades* at Ft. Diedrich. If one of their *really* juiced-up recombinant DNA bugs ever gets out of there—there *have* been breaches, you know, even though it's a P-4 containment system—well, there could be another damn plague!"

Rich looked shocked at my words. He was still an idealistic kid, with no appreciation for the almost cruel insensitivity enormous institutions can achieve. I decided to drive home my point.

"Or, if you need another example, did you know that when thermonuclear weapons were first being studied on paper that there was the very real worry that the intense heat created might ignite the heavy hydrogen in the oceans, or start a reaction in the atmospheric nitrogen? The oceans and atmosphere might literally be set on fire! The odds were calculated to be about one in three million, which might sound good—but think of the consequences if it had happened! But, obviously, they went ahead and built H-bombs, anyway."

"Yeah, I guess you're right, John. Maybe my numbers didn't sound so bad to them, after all." Then Rich took the final step in the reasoning. He looked at me with apprehension. "My God, you don't actually think those idiots would go ahead and *build* a ring, do you?!"

Why worry him? It wouldn't do any good. "No, of course not, Rich, don't worry about it. You were right—this *was* sort of a test. Not about your security clearance, for heaven's sake, we just wanted to see if you had had any additional thoughts on your calculations, and thought asking you again, all of a sudden out of left field like this, would be the best way." I tried to sound natural as I chuckled. "Sorry to have put you through that. Forget it! Come on, let's get back to work."

My words obviously calmed Rich down. His attitude swung full pen-

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dulum the other way now, and he began to joke about it. We got up and started to walk back to our offices. "Boy, John, you sure put a scare into me! You know, those damn rings *would* be a real tiger by the tail. There'd be no way to get rid of it once you got one going. Since they're antimatter, you couldn't just bury it like radioactive waste. And you'd be taking a *real* risk to try boosting it off Earth with a rocket. Man, can you imagine what it would look like if you had an abort? What a Fourth of July *that'd* be!"

Yes, indeed, I could imagine it. I knew then that's what Rod had been imagining, too. It's one thing to have a dangerous weapon that you can control, but who wants to fool around with one that's subject to random chance? Unfortunately, he hadn't known about the quantum-gravity equations when he'd first dreamed the damned thing up. Now it's too late, and I guess that's why Rod hasn't gone public with it. It'd be like yelling fire in a theater—the resulting panic would be a catastrophe as bad as a ring detonation.

I was jerked out of my thoughts by Rich's voice as he continued his speculation on what he thought was only a might have been.

"Yes sir, if you lived even five hundred miles away from a fully charged ring that blew, you'd have maybe two, three milliseconds before the radiation storm turned you into a hot mist. God, it would be like a miniature nova, right here on Earth!"

I nodded back, grimly. Rich's good humor was starting to get to me.

"But everything has its brighter side, too. Even the antimatter rings. The radiation storm would no doubt blast the local atmosphere to hell and gone, and there wouldn't be any overpressure shock front to worry about!"

I didn't say anything, and Rich finally saw I wasn't amused.

"Sorry, John. I guess it's no joking matter. But it could never happen. The people wouldn't allow it."

"Rich," I replied, somewhat exasperated, "just what the heck do you mean by that? What do 'the people' have to do with it?"

"Why, if the government tried to build these antimatter rings, Congress and the States and, and—*everybody*—just wouldn't allow it!"

I looked Rich square in the eyes. It was time to knock a little of his innocent naiveté away.

"Maybe so, maybe so. But you're making one, simple, elementary assumption about the advocates of the antimatter bomb that *may not be true*. What makes you think they'd even bother to ask for permission?"

That was a couple of hours ago, and I left Rich in the hallway staring open-mouthed at me. He's a bright kid, though, and I don't doubt that he's already putting two and two together.

Rod pulled me into his nightmare with his letter. Now you're in it, too. We can both damn his soul. And those of the bloody bastards who do as they damn well please without restraint, without public accountability.

Pleasant dreams. ■

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BY KELLY FREAS

in the beginning

It's hard to realize that effectively two generations (an SF generation being approximately four years) have passed since I last had the pleasure of talking with John W. Campbell. Harder still is the realization that by far the majority of today's readers were never exposed to the Campbell magic, and know him only, perhaps, as required reading for Modern Science Fiction 101. But there are still many of us to whom Campbell *was* science fiction, and everything else merely filler for the dry periods between issues of Astounding.

"Define science fiction? Of course! Science fiction is the stuff I publish in Astounding."

There were one or two people who disagreed, but none could dispute the fact that for over thirty years John W. Campbell, Jr. set the styles, determined the parameters (so he could kick his way beyond them), and broadcast the ideas which generated most of the stories being written.

John W. Campbell, Jr. (1910-1971)

Students of science fiction as a genre apparently have yet to realize that *only* magazine SF was important in either a literary or a monetary sense up to the early sixties. We were well into the fifties before a significant amount of SF became available in *either* hardcover or paperback. Science fiction was the magazine. Not only did Campbell offer the highest pay: he repeatedly, in print, invited new authors to submit stories. And further, any writer short on ideas need only to have lunch with Campbell to be provided with enough concepts, and frequently complete plots, to keep him busy for weeks.

"I *like* young Querty. When I throw an idea at him, he catches it on

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. was Campbell

Margaret Winter (Peg) Campbell (?-1979)

the run, and usually carries it to a touchdown." (Campbell was sharing a floor with Street & Smith's sports magazine at the time.)

There are numberless tales about Campbell's mercurial temperament, his violent (and violently swinging) opinions, his dogmatism, his ruthless criticism, and above all, his rigid insistence that things be done *his* way.

All of them are wrong.

For instance, it wasn't *his* way he insisted upon: it was the *right* way (anyone of the six-and-ninety would do) for this particular problem. In one case, he sent a story back to the author five times, insisting that the ending be utterly logical, and consistent with the premise of the story, however unpleasant it might be. The resulting story became a classic.

Ruthless? Perhaps. Campbell chopped me off at the ankles more than once—to my lifelong benefit. He was perfectly willing to admit that he knew nothing about art; but he knew storytelling and he knew what it took to illustrate a story. John had no use whatever for abstraction, very little for stylization, and barely tolerated anything that approached the fashionable.

"Page decoration, that's all it is. Astounding is *not* a fourteenth century manuscript! We can't waste space just decorating pages. Give me pictures that tell me something about the story!"

What he most liked to get from me was that part of the story which is impossible to verbalize—that something extra which makes story and picture inseparable parts of the reading experience. Short of that, he liked a very realistic treatment of a scene in

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the short story, serial or novelette.

"Look," he said, "if I could send a camera to Mars, or into your bloodstream, or into the future, I'd use the camera. But you're all I've got. So *be* a camera, OK?"

Yes, Campbell could be a rough critic—to the people he thought tough-minded enough to profit by it. But I have seen him treat a new and sensitive soul with such gentleness that the tyro never even felt the least put down. More than a few artists and writers left a pleasant and inspiring interview with John simply overflowing with new ideas, eager to try them out, and only vaguely regretful that Campbell's narrow field had no room for their unquestionable abilities....And Campbell wasn't being hypocritical—

"That I can't use a man's work doesn't necessarily mean that it's bad, any more than the fact that he does great work means that I have to buy it for Astounding."

John's enthusiasms were legendary—and often led to acute frustration in a writer who leaped onto the bandwagon three months too late. Campbell felt that his own major function was to stimulate minds; and as soon as he got a few others working on an idea, he felt free to turn his attention elsewhere. But while he was hot on the trail of a concept, he would discuss it with anyone incautious enough to get in range—authors, waitresses, cab drivers, even artists. It didn't matter how little his listener knew about the subject. John was perfectly willing to teach his listener enough of the basics for the listener to form a more or less 'intelligent' opinion.

One of Campbell's favorite techniques was to ask a question such as, "What sort of technology do you suppose might develop on a planet with virtually *no* heavy metals?"

Now—he didn't care *what* your answer was. His interest was in the *way* you answered, and the way you thought about it. Did you consider the question seriously? Did you approach the problem methodically? Did you bring any originality to bear on the problem? Did you come up with a reply which showed some understanding of the situation, without the usual sycophantic drivel?

It was probably inevitable that Campbell should get a reputation for dogmatism, intransigence, and simple bull-headedness. He enjoyed nothing so much as a good fight, even (or perhaps especially) when he lost. John always made a point of stating his own opinions in such a definite and rigid form that a valid attack on either his data or his reasoning would bring the whole structure down in a heap.

Unfortunately for his detractors, Campbell had a mind whose breadth and scope was matched by the clarity and depth of his perception. He wasn't *often* wrong, and even his errors were Homeric. Whenever he discovered that he was headed in the wrong direction, he was quite capable of making a 180° turn in full career, without missing a beat. Less agile minds naturally found this ability annoying.

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John loved a good intellectual scrap, preferably one with plenty of hard data to juggle, but he was perfectly capable of calculated violence when violence was called for. Peg could never understand why John would repeatedly subject himself to the sort of bear-baiting he encountered at conventions, workshops, seminars, and even at parties. The attackers went at him like a pack of hound-dogs after a possum—and retired in yelping disorder when the possum turned out to be a grizzly.

It took me a good many years to realize that John Campbell was utterly and completely consistent—even when he appeared to be contradicting himself. He knew exactly where he was going; he knew exactly what was required to get there; and he knew that goals and means of reaching them change as inexorably as the phases of the moon. In you or me, it would be a fault: on Campbell it looked good. It kept him (and his work) alive, vital, and exciting to everyone who encountered him, however violently they might disagree.

If John W. Campbell, Jr. created many of the writers who made up the science fiction roster in the 1940's, it could equally be said that Peg Campbell created the John W. Campbell, Jr. who dominated the science fiction of the fifties and sixties.

Peg Campbell was a rare and powerful personality herself—and certainly John never let anyone forget it. He was justifiably proud of her in every way, and it delighted him that she could and would stand up to him in argument—and frequently plow him under, when the subject lay in her territory.

Banker's daughter, English teacher, highly skilled in several crafts, she was also a fine business person. She had started (and sold) several successful businesses of her own. John was vastly proud of her business ability: it was a talent which he ruefully admitted he did not share. Peg was particularly knowledgeable in the art of crewel embroidery, and was for several years advisor on the subject to the British Museum, among others both American and European. John functioned happily as her photographer, taking as much joy in *her* expertise as he did in his own. He would all but snatch people bodily off the street—or hotel corridor—to show off her work. Of course, to see it was to admire, but even more, you felt a desire to do it yourself, at which point Peg was prepared to sell you all the necessary materials and guide your first steps. She would have made a great pusher.

I sometimes suspected, however, that the quality that most endeared Peg to John was her rather zany sense of humor, which ranged from the most abstrusely erudite to the bawdiest slapstick. She played a great honky-tonk piano, and spent years looking for a good recording of a song which started—

"I'm looking for a guy who plays
alto and baritone
And doubles on a clarinet

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And wears a size thirty-seven suit
Boodle-do-wa-wa . . . "

Peg was a superb hostess. She never had trouble keeping a party in high gear: around her everyone seemed to come to life. She wasn't much impressed by science fiction. Yes, she could see the importance of the ideas—but the writing and the characterization gave her indigestion, and she didn't mind saying so, in terms usually tempered more by her victim's sensitivity than his professional status.

Sometimes all the talk wore her down—

"But you don't *go* anywhere! You just go round and round, restating the same old problems, discussing the same things over and over . . . and you never solve *anything!*"

"Ummm . . . yes. But Peg, how many times have you listened to Beethoven's *Moonlight Sonata*? Do you enjoy it less because you have played it so often?"

That sort of thinking Peg could buy. Sometimes . . .

Living with John could hardly have been easy, but Peg was perfectly able to cope. When she married John, she went into a motherless, utterly disorganized house, and made it into a warm and loving home. John's two daughters adored her, perhaps not least because she believed in the direct approach—as when she calmly tipped a bowl of ice cream into John's open shirt front in response to his kidding . . .

Theirs was the good marriage of two intelligent adults who clearly—and dearly—loved and respected each other. It was also a partnership between two strong people of very dissimilar nature and interest, looking for (and finding) many basic answers together. Each brought a great deal of happiness to the other.

I said in my book, *The Art of Science Fiction*, that when John Campbell died, much of my pleasure in science fiction went with him. Not that working with him was easy, but he kept his people—or at least *me*—feeling that it was worth the effort. Working with Campbell, one could never forget that one's primary function was to entertain—*but*, through this very entertainment could be laid the foundation for a whole new world . . .

Over the last few years, there has developed, in science fiction, a perceptible tendency to minimize, downgrade, or simply ignore John W. Campbell's importance to the field; and there are certainly those in the field who would deny that he had any influence on *them* whatever. There are, thank heaven, many, many more people now working in the various scientific disciplines (and even some in the arts) who eagerly admit that they wouldn't be in their particular specialty but for the inspiration Campbell gave them.

I mentioned before that to me John W. Campbell, Jr. was only a few steps lower than God. From the perspective of eight years without his presence, I begin to suspect that I underrated him. ■

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twilight song

Imagine a future world of great personal liberty: a society with no government save one of specific and limited powers bound by a universally respected constitution.

Imagine further that this society sends forth colonists, who in due course arrive upon an inhabitable world teeming with native life; and that one of those life forms is strange, exotic, beautiful, complex. It is an alien that communicates with its own kind, but seems little concerned with humans and their technology; an alien which does not interfere with our colonization, but goes its own way and minds its own business.

Now imagine that among the colonists is one who finds the aliens are edible and begins to slaughter them in great numbers and sells their carcasses as food. "You must not do this," some of the colonists say. "You have killed most of them already, and soon there will be none left at all."

"Go away," is the reply. "I need an income, and I have never contracted with you to spare these creatures, which I don't find particularly nice to begin with. I don't believe I'm exterminating them, and even if I were, it's none of your business. I can sell and my customers can buy, because that's freedom."

Query: should that man's freedom be curtailed? By what right or principle? The aliens have not asked for help; whether because they will not or cannot is not known. But I ask, is it just to use force—if need be deadly force—to restrain the slaughter?

I wish my ugly tale were a mere exercise, a hypothetical question for debate of an evening.

If you go to the tropical seas at the right time of year, and if you are very fortunate, you may hear the songs of the whales.

They are true songs: that is, far from random collections of sounds, there is an exact sequence often repeated. The songs are quite lengthy, so long that until recently their nature was not suspected.

We have no glimmer of what the songs may mean—if indeed they have meaning at all. Marvin Minsky speculates a practical purpose, to describe the shore-lines for the young, or, perhaps, to warn the herd away from no longer profitable feeding grounds. My partner Larry Niven offers the possibility that they sing epics of times of old, when they roamed the land and had not yet finally gone back to the sea.

For all we know, these songs come to us from millions of years in the past, passed down from parent to child, through ages of ages.

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They soon will be heard no more. Within our lifetimes, the last of the songs will vanish with the extermination of the singers. Of course we have preserved a few songs on tape; indeed, we recorded a portion of one song and put it aboard a spacecraft which has departed our solar system and now wanders among the stars. I do not think that among the records we put on that spacecraft there was a motion picture of the singer flayed.

The cetaceans are unlucky. They inhabit the wrong planet. Had Mars oceans and had they lived there, what a marvel we would have thought them! Surely we would not have slaughtered them, devising efficient processing systems to rend their flesh until it can truly be said that nothing is wasted except the whale.

Or if we found the same creatures swimming through the under-ice oceans of Europa, would we not count that the scientific marvel of the century? But because we find them here, we watch them killed and eaten.

In the hypothetical situation that began this I asked if one or more of the colonists had the right to restrain the slaughterer, and if need be to use deadly force. The same question applies to the whales. International agreements have failed, and will continue to fail. Many species may be doomed already; survival for others depends upon their obtaining powerful protectors. If there aren't any whaling ships, then whales may survive. Anything short of that is so much hot air.

I've thought of a story on that. It opens with an advertisement in *Soldier of Fortune* magazine: "wanted for immediate hazardous sea assignment, underwater demolition team; submarine navigator; torpedo technicians. Moderate pay, interesting work, contact Box Whalesong SOF..." Perhaps some day I'll write the story.

Meanwhile, I've come to the real topic of this column: conventional military power in a nuclear era.

I get a lot of mail; recently I had four letters from readers of draft age. The letters were remarkably similar. They began by stating agreement with my view that intelligent application of science and high technology can save the world. They continued by speculating that our current call for conscription was no more than a particularly stupid extension of an almost nonexistent national energy policy; and they ended by asking my views on military power in the thermonuclear era.

They also asked my advice about the draft.

Hard questions. Important questions. I'm not at all sure my views on the subject are worth a lot. But a few points do seem clear to me, and I'll try to make them.

This nation has no military policy. We have a series of doctrines patched together from various administrations, but all we really have is a body of nonsense that we treat as policy. Over the course of the years we have forced ourselves into the silliest cor-

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ner imaginable: we can threaten suicide, but we have damned few military options short of that. We've given up any thought of strategic defense. We have neither missile nor air defenses, not because we cannot build them, but by deliberate choice. Our official policy is MAD: Mutual Assured Deterrence.

The MAD doctrine is easily stated: if a nuclear war begins, it will instantly escalate to a full-fledged spasmodic launch of everything we have. We will not target the enemy's military forces. Instead, we will destroy his cities and citizens: "inflict unacceptable losses on his industrial, agricultural, and population centers," in the sanitized bureaucratic language of MAD documents.

The weakness of the MAD strategy should be obvious. At its very best it simply neutralizes long-range strategic weapons. Assuming MAD works perfectly it will at best prevent a potential enemy from firing nuclear weapons at U.S. cities.

What MAD cannot do is present a credible threat of nuclear attack in retaliation for anything short of the actual detonation of nukes on U.S. soil. We cannot defend ourselves, and if we launch the ICBM and Submarine Launched Ballistic Missile (SLBM) forces they will not appreciably lessen the terrible revenge the enemy will take—and the enemy has nothing left to lose. MAD may be able to deter attack on the U.S. itself; but under the MAD doctrine our ICBM and SLBM forces can have only trivial impact on the defense of Europe, Israel and our other allies.

It is as if we had to say "If you rob my friend, I will blow your brains out by shooting through my own head"—a threat credible only if the other side believes we really are mad.

I thought MAD was truly insane when we first adopted it, and I haven't changed my opinion. In my judgment we ought to be engaged in a defensive arms race: we ought to be spending large sums on air defenses, ballistic missile defenses, fallout shelters, civil defense programs: the nuclear era equivalent of the Swiss system of defense. I have never understood how U.S. ballistic missile defenses were "provocative" and threatening, nor have I ever understood the morality of a homicide pact which deliberately holds innocent civilians hostage to politicians' good judgment—especially when the only civil defenses we have are intended to save those very politicians. I'd like to see us abandon MAD and build defenses.

But leave that. Even if we change doctrines we are, for better or worse, stuck with MAD for most of this decade. And MAD has an inevitable logic: given MAD, if you wish to defend your friends, you must have forces to do it with. You need conventional forces.

Worse, if your role is defense you will always meet the enemy at a time and place chosen by him, not you. He gets the advantage of surprise, concentration of force, local superiority

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...all the factors which military theorists have always believed important if not decisive.

Thus you must either have a very large army or a very sophisticated one.

At the moment we have neither.

Our all-volunteer army is not large enough to overwhelm the enemy by sheer mass; and the average recruit simply isn't capable of maintaining and operating highly sophisticated equipment. This isn't to say we don't have some splendid military units. It isn't to say that we don't have some of the finest troops the world has ever seen. We have dedicated personnel in all ranks, and the best we have are admirable. But there aren't enough, and it's obvious to everyone in the world that there aren't enough; and that situation is intolerably provocative, because it encourages the adventurists among the Soviet strategic thinkers. We *might* be crazy enough to blow our brains out in defense of our allies, but we aren't going to do it in ambiguous situations. We won't do it for whales, Cambodians, or Afghanis.

The obvious remedy is conscription.

It's an ugly remedy; a contradictory remedy, in that it is the ultimate restriction of liberty made more horrid because done in the name of liberty. Robert Heinlein once told me that a society that can't get enough voluntary defenders isn't worth defending, and he may well be right.

But democracy is not liberty. Whether you can have liberty without democracy is an ages-old question, and far too complex for our present space. Yet might Aristotle have spoken truth when he said that democracy is a horrid form of government, but the others are worse?

Conscription is not undemocratic. Indeed it is in a sense the ultimate in democracy, employed by nearly every democracy from Athens onward.

There are even those who believe democracy cannot endure without conscription: a volunteer or mercenary army is a thing apart from its citizenry. A truly professional army is responsible only to its officers. The Roman Republic had the most stringent conscription laws in history, and so long as the army and the citizen body were the same, the legions were not and could not be employed against Rome; it was only when the legions became long-service volunteers that Marius and Sulla and the Caesars could send the legions against the state whose eagles they carried. Similarly, the Swiss have nothing to fear from their military, because there is no distinction between Swiss citizen and Swiss soldier.

Moreover, it is easier to send a volunteer army into a reckless adventure than it is to send conscripts. That has not always been true, but I think it fairly obvious for the United States in the 1980's. I do not agree that because the Montagnards and Laos and Khmers and Nung were not white they were not worth our defense; but certainly one major reason we ended the bungling idiocy of Viet Nam was precisely because the army we sent

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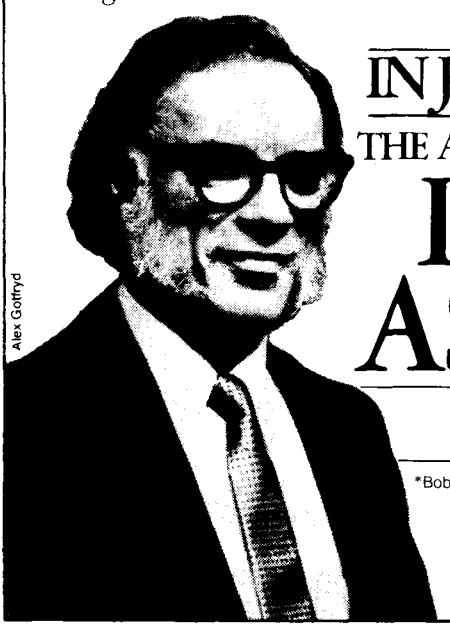

Alex Gotfryd

IN JOY STILL FELT

THE AUTOBIOGRAPHY OF

ISAAC ASIMOV

1954-1978

*Bob Mecoy, *Future Life*, on *In Memory Yet Green*

DOUBLEDAY

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there was manned by our sons. It was not a legion of hirelings.

Now understand: it is possible to create a very effective military force of "volunteers." The training and discipline we would have to employ would little resemble those now used, and the local police would become more important than the recruiting sergeant in filling its ranks; but it could be done. Whether you would want such an army is something else again. It would feel no loyalty toward the civilians who paid it.

Our problem is simple: to survive with our liberties intact; to get past the next few years to a time when the Third Industrial Revolution has made irrelevant many of the economic problems we now face. There is in this land a generation not afraid of science and technology and space, a generation which I think will readily make the investments needed to carry us to the planets; a generation that will transform history. In my judgment Buckminster Fuller was profoundly right when he said "the future is a race between Utopia and disaster." I see very little chance that the world can continue as it does at present. Over the next fifty years the world will undergo changes so dramatic as to make much of our history irrelevant—or else we will see the fall of this civilization and a dark age of deepest gloom. I think that if we live long enough, the next generation will make the proper choice.

So what is the best course for survival? What choices have we, here and now, in the United States today?

On the strategic level we have few enough alternatives. One, unilateral nuclear disarmament, is politically unlikely, and certainly abandons most of the world to the fate of the Afghanis and Khmers, whether or not we build a large conventional army. UD would tempt the reckless in the Kremlin; it mortgages our future to the good will of those who so far have proven to have very little good will. Secondly, we could continue MAD and install whatever minimal strategic weapon systems as are required to make MAD credible. Third, we could substantially increase our strategic *defense* efforts along with maintaining the MAD strike capabilities. Fourth is an all-out strategic arms race, which is also politically unlikely, and whose cost would probably substantially delay the industrial exploitation of space. An arms race is obviously preferable to a nuclear war; but how stable is a world enduring an arms race?

Choices at the tactical level are somewhat constrained by our nuclear strategic choices, but are also partially independent of them. One, we can do without conventional forces at all; secondly, we can continue as we have with a "volunteer" force treated as hired citizens in arms, a force able to deal with small nations but not with large; third, we could construct legions, which is to say make our voluntary force a truly professional army living under a harsh code and recruited in large part from courts

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and jails and the streets; fourth, we can become an arsenal for others, employing whole nations as our mercenary surrogates, and arming anyone likely to be "the enemy of our enemy." This latter has two disadvantages: it makes the world an armed camp, and we, like the Soviets in Cuba, may have to commit troops to shoring up unpopular governments lest we be forced to fight our own weapons.

Finally, we return to conscription.

Of those my preference would be for strategic defensive weapons and a conscript army. It would take a book which I may someday write adequately to defend my preferences; I am well aware that my choices are not obvious. Some of my reasoning is given above; more is deducible from the whole body of my writings. I am not comfortable with conscription because I think it is evil.

But to say something is evil is to admit that both good and evil have objective existence; which is to say that there are degrees of evil. And to admit that is to say that there must be far worse things than conscription. For candidates I would put the use of nerve gas on Afghan villages; the rape of the boat people; the deliberate extermination of the literate class in Cambodia; the enslavement of a great part of Viet Nam; the artificial famine of the Ukraine and Stalin's Second Revolution; the Holocaust. Indeed a long list of horrors. I think those should have been opposed. I think more horrors like them will come forth unless they are opposed; and I would like to see us strong enough that our opposition is meaningful, so that few will be tempted to try such horror again.

John Stuart Mill put it thus: "War is an ugly thing, but not the ugliest of things; the decayed and degraded state of moral and patriotic feeling which thinks that nothing is worth war is much worse.

"A man who has nothing for which he is willing to fight; nothing he cares about more than his own personal safety; is a miserable creature who has no chance of being free, unless made and kept so by the exertions of better men than himself."

And whether one believes that or not, you may be certain that the fighting troops believe it. You may then estimate their opinion of those who will not fight.

And thus full circle. We will, very soon, decide whether we will have the power to defend our friends, whether human or cetacean. That choice may be irrevocable.

We live in times of hard choices. We are coming to times when history itself may no longer guide us.

We are not there yet. All history seems to confirm a paradox spoken to the Senate of Rome in 300 B.C. by the patrician Appius Claudius the Blind at a time when Roma was not invaded but her allies were endangered: "If you would have peace, be thou then prepared for war."

We are not prepared for war. ■

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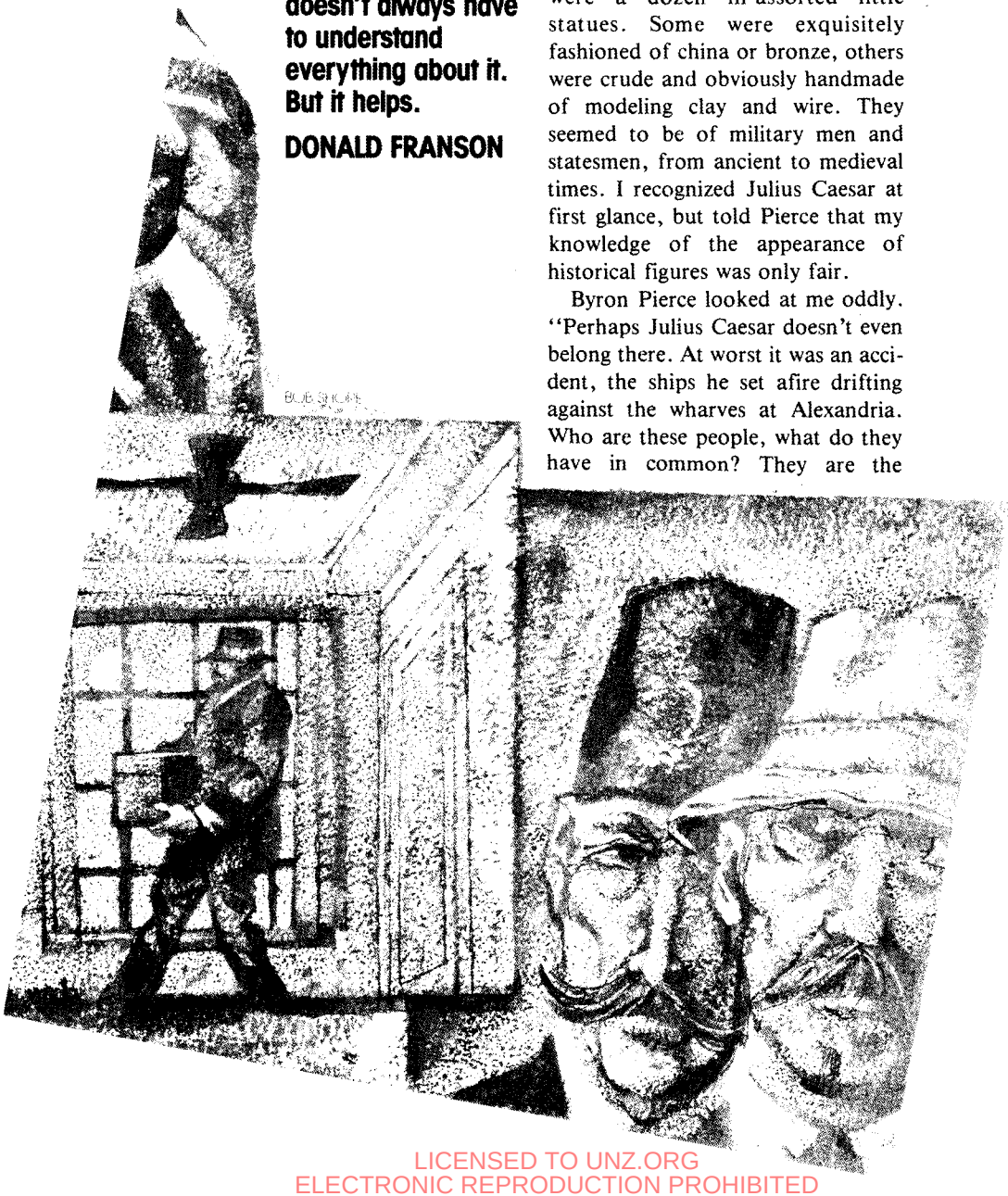
ONE TIME IN Alexandria

The user of a tool doesn't always have to understand everything about it. But it helps.

DONALD FRANSON



Ranged along the top of a bookcase were a dozen ill-assorted little statues. Some were exquisitely fashioned of china or bronze, others were crude and obviously handmade of modeling clay and wire. They seemed to be of military men and statesmen, from ancient to medieval times. I recognized Julius Caesar at first glance, but told Pierce that my knowledge of the appearance of historical figures was only fair.

Byron Pierce looked at me oddly. "Perhaps Julius Caesar doesn't even belong there. At worst it was an accident, the ships he set afire drifting against the wharves at Alexandria. Who are these people, what do they have in common? They are the

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destroyers of knowledge. My favorite enemies, as a librarian."

I indicated my interest by remaining silent. The quietness of the inner office of the library somewhat awed me, as did the professor, though a friend of long-standing. Eminent archaeologist (specialty, ancient writings), and now head of the Norland University Library of Antiquities, he had invited me here when I phoned that I was in the city, and now we were discussing our mutual interest, the written word. *We* weren't discussing, he was. I was listening. Listening to Byron Pierce is always worthwhile.

"The Emperor Shih Hwang Ti, of China," he said, pointing to a jade figurine. "He tried to eliminate all literary works he didn't agree with, which was most of them. Some of them escaped, fortunately, else we wouldn't have Confucius and others." He moved on. "The Caliph Omar. When his general Amru captured Alexandria, he asked Omar for instructions concerning its famous library. The Caliph is supposed to have replied, 'If these writings agree with the Koran, they are unnecessary. If they don't agree, they are pernicious. In either case, destroy them.' A philosophy foreign to later Moslems, needless to say. This wasn't the original collection of Alexandria, of course—that couldn't possibly have lasted till 642, what with Aurelianus, here, burning down the entire Brucheum district in 273, and Theophilus, the Christian patriarch, destroying the smaller library in the Serapeum, along with that pagan temple, in 390. These were replacement libraries, collected by the Romans and Byzantines, but some knowledge, still existing, was lost forever each time. A pox on them all. All the ancient book-burners."

"What about the modern ones, Hitler and such?" I asked.

"In modern times no one, not even Hitler, could possibly destroy *all* the copies of any printed work. As for censorship—books kept under lock and key are preserved for posterity. But books that were burned in the days of few copies, before the invention of printing, are gone forever. Printing not only multiplies them, it scatters them—sometimes a force for preservation. Most of the ancient volumes were concentrated in a few libraries, mostly the private collections of the rich or scholarly. Alexandria might have been the first public or university library—the ancestor of this one. It had over seven hundred thousand volumes, or rolls, toward the end."

He reached into a cabinet, brought out a cylindrical case, shaped like a mailing tube. "Actually, a volume was not so large. The early librarians broke down the longer works into rolls of manageable size." He opened the end of the tube, and pulled out a

Please Note. *Last month's Science Fact article, Steamer Time (Again?), was a previously unpublished piece written by Wallace West. The copyright line which appeared on its title page referred to all artwork which accompanied the article.*

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roll of papyrus. He tossed it to me. I handled it gingerly. The material resembled paper, but I could see it was made from strips of the Egyptian reed, carefully pressed together. It seemed to be very ancient.

"Don't worry, it's only a replica," said the professor. "Unroll it with your right hand, roll it up with your left, as you read."

I followed his instructions, except for the reading—it was Greek, all run together, without spacing or paragraphs. I could recognize the symbols, but that's all. "Wonderful," I said, handing the roll back. "But it seems to me that the chief enemy of librarians is fire."

"One of them," said Pierce, rerolling the scroll from the other end and returning it to its case. "There are many other methods of destruction. But we are constantly working on fireproof books. Here's a sample." He handed me a book.

It looked like an ordinary book, slightly heavier. I didn't set a match to it, as he suggested. I just nodded and handed it back, taking the professor's word for it.

"Here's another. One that's been through extreme heat."

"It looks like a lump of slag," I said, turning it over.

"It *is* a lump of slag," said Pierce. "But it was a book, made of a certain material. It only remains to reconstitute it—it's all there, and in order. We are working on such things, here at this library."

"Well then, you are just the opposite of these, uh, gentlemen here. You are a preserver of knowledge."

Pierce looked uncomfortable. "I'd like to think of myself as that. Yes, I would like to think of myself as a preserver of knowledge." He fell silent.

It had been a quiet morning in the office, no telephone calls or visitors to disturb us. Now the buzzer of the receptionist sounded. Pierce came out of his reverie, and thumbed the switch. "Yes?"

"There is a gentleman to see you. A Mr. Nichols."

"Ah, yes. Send him in." Pierce, his good humor restored, winked at me. In a moment a small, poorly-dressed man came in, with a package in his arms. He rested it on the desk, then looked at me doubtfully.

"My assistant," explained Pierce. "Now let's see what you have there."

The man opened the package to reveal a strange machine. It looked like an old Thermofax duplicator, crudely rebuilt.

"I'm an engineer and I saw your ad..." began the visitor.

"Never mind that. What is it? What does it do?"

"I call it *Tempofax*. It copies ancient documents..."

"We have such things here," said the professor. "After all, this is a library specializing in archaeological research..."

"I mean ancient documents that don't exist any longer," said the man.

Pierce became intent. "I would like to see that. Can you give me a demonstration?"

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But the inventor explained (as I had expected) that a demonstration wasn't possible, just yet, and the disappointment showed on Pierce's face. The man began to argue that development wasn't complete, funds were needed, and so on, and Pierce finally silenced him by referring to me as his lawyer. Soon our visitor left, taking the machine with him, promising to keep in touch.

"Do you actually advertise for these nuts?" I said.

He nodded. "A hobby of mine. You have your mad scientists, in your science fiction. I have my mad engineers. Some of them leave their models." He indicated another glass case, with queer little machines within.

"Do any of them work?" I asked.

He shook his head, sadly. "No. But some of them are close. Some of them...." He seemed lost in thought.

After a short time he resumed. "Wouldn't it be wonderful...if time travel really existed, and you could go back and reconstruct all the lost literature of the past? You wouldn't be changing anything..." Suddenly a troubled expression flitted across his face, as of an unpleasant memory. "No...it would have to be done differently..."

I sensed a story coming on, so I waited silently. As I expected, after a short pause he began...

We were finishing up at Abu Simbel (said Pierce) and some of the engineers were leaving already, their job completed. I suppose you know something of Abu Simbel—the ancient temple of Rameses II on the Upper Nile, that was threatened by flood waters from the Aswan High Dam, until they moved it, piece by piece, to higher ground. A great engineering feat, as you might imagine.

This was before the Six Day War, and Americans weren't so unwelcome in Egypt as later. I was there to record inscriptions that weren't going to be preserved—of the "Kilroy was here" variety, reaching back to the sixth century B.C. I had time to make friends with some of the engineers, and one of them was Karl Fagerquist, from Sweden.

After a wild going-away party at his quarters, about dawn, when everyone else had gone or passed out, Fagerquist took me aside and showed me something. It looked like an ordinary suitcase, and I thought he wanted to show me something he was packing, something he was taking out of the country, perhaps illegally.

He opened the suitcase, and there was a machine inside. In fact, there was room for nothing else. It looked something like a tape recorder, or a shortwave set, or anything else you could imagine a Swedish engineer constructing in secret. Inside the lid was a large glass screen. There were spools of microfilm and what-all, tucked into the sides of the case.

Fagerquist turned the suitcase so that its open lid backed up to the window, where we could see in the dawn's increasing light the distant colossi of Abu Simbel—or could

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have seen them if they were still there, instead of in pieces on the hilltop, awaiting reconstruction. Fagerquist flipped switches here and there, and a sharp picture, in full color, appeared on the screen. It was exactly like the scene outside, only smaller; more like a scene in a *camera obscura* than television. "Watch," he said, snapping more switches.

The scene flickered a bit, but remained the same. "Even though it's the same time of day, the light is slightly different," he said, cryptically. More flickering, and then before my eyes, the giant figures of Rameses, all four of them, began to reappear. The sand rose and fell, covering them completely, then exposing them to view once more, just as they were before the project started.

"This is marvelous," I said. "Stop motion—must take a lot of patience. So that's what you've been doing in your spare time."

"This is not a movie," said Fagerquist indignantly. "Keep watching."

I kept watching. I felt unsteady, from the effects of the celebration and the hour, but gazed fascinated at the suitcase-lid screen. The sand rose higher and covered the feet of the seated figures. The colossal statues of egotistical Rameses were all identical except the second from the left, which had ages ago lost its head, now lying shattered at its feet. Fagerquist moved a lever, and the flickering speeded up, then stopped altogether, or was undetectable.

"Watch the second statue," said Fagerquist. Suddenly, it was whole. The Swede flipped a switch and the scene remained still.

The four colossi were intact.

"How did you do that?" I said.

"You idiot, this is not a movie," said Fagerquist. "This is a time-viewer. Or something. You give it a name." He snapped off the view and closed the suitcase lid.

You can imagine, I was amazed. But it was six o'clock in the morning, and I was in the mood to believe anything. I kept talking with Fagerquist, and he told me the whole story. I don't think he would have told me any of it, had he been sober. But neither was I, entirely, and I believed...

"I can't get it out of the country," said Fagerquist mournfully. "I built it here, but there's more treasure at Abu Simbel. I know, because I looked. That damn Rameses. He spent too much money glorifying himself, so he didn't leave any. But—elsewhere in Egypt! The Valley of the Kings, Karnak. You are an archaeologist..."

"Did you say—treasures?" I asked.

"Of course. That's what I built this for—a treasure locator. Go back and watch them while they bury the treasure. Then you know exactly where to dig. Go to Luxor, find tombs, record their locations, pick out the ones that have never been discovered or looted. There's even an infrared attachment so you can see inside unopened tombs. Then you can start digging operations—no speculation. Thanks to our work here

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at Abu Simbel, the United Arab Republic will now let foreigners keep half the artifacts they uncover."

"Why don't *you* go to Luxor?" I put in suspiciously.

"What place is there for an engineer there? My contract here is done, I go back to Sweden. Besides, I want to work on a small improvement that will make it possible to physically retrieve the artifacts—the gold and jewels—get there before the looters, so to speak. It will not be easy to find undiscovered and unlooted tombs, but *you* could do it, with this machine as it stands. I am rather short of cash, just now."

I nodded absently. I was thinking along my own lines. Treasure, gold? What was gold to me?

He saw me hesitate, tried further arguments. "You understand this must be kept secret. If the U.A.R. government knew of this machine, I would not have it long. I wouldn't trust *any* government with it. So whatever treasure you may locate need not even be reported. When I get back I will have a better machine, but in the meantime, if you lose no time, you can clean up. How much can you afford? Anything you may have is less than the machine is worth, even as is."

I countered with, "How much do you need?" We finally settled on $6,000, for the suitcase alone, with full instructions for operating it, no construction plans included. I was satisfied with the bargain, strange as it may seem to you. I had seen the thing work, and I felt there was no deception involved. I made out a check at once, on a Cairo bank where I had University funds. We parted best of friends. I never saw him again.

I took the suitcase in the company car back to my own quarters, but didn't do anything with it till I was ready to leave, several months later. Closed, it looked like any suitcase. It was only moderately heavy, and might pass for a case full of books and papers, in the hands of a porter. The last night I packed my other suitcases, gazed lovingly at my prize, and could hardly wait. Gold, jewels, musty Egyptian tombs? Digging in sand, for baubles? Not for me. I was going to Alexandria.

I took the shuttle plane to Aswan, then United Arab Airlines to Cairo, where I settled my affairs, such as they were. Then off for a holiday, by the sea, ostensibly to rest...

Al Iskandari'yah. It was dark when I arrived, and I had to direct the taxi driver to the hotel I had chosen, a small one with a distant view of the east harbor. I checked in, told the Egyptian clerk I was on a vacation, intended to stay a week, but wanted to retire early.

"But the casinos are just beginning to come alive," he protested, smiling. "I can recommend a guide for a three-hour tour of the nightlife..." I shook my head, he shrugged, and called the porter to take my bags to the lift. My room was on the third floor.

I gave the man an extra ten piastres

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for the case of "books," and he left me in the pleasant little room. It was not ten o'clock yet, so I occupied myself with unpacking, knowing I would be interrupted, in the usual manner of such hotels, with offers of services and solicitous questions, which I'm sure I encouraged by further tips. When I thought the barrage was over, I undressed, put out the lights, pulled up the blinds, and got into bed. The night view of the city and harbor was superb. The peninsula resembled a string of pearls, with the lighthouse at the end a flashing diamond. I lay there listening, then I got out of bed and got the suitcase, hefted it up to the bed. I felt like a conspirator, in my pajamas...

My heart was pounding, but I couldn't be sure whether it was from anticipation or apprehension. Perhaps both. I had been concerned about the suitcase, but it had not been inspected, only weighed, for the planes. (This was before the prevalence of hijacking.) There had been no customs inspections, since I was already inside Egypt. Why the secrecy? Well, the Swedish engineer, Fagerquist, had said he wouldn't trust any government with this machine, considering its obvious military applications. And I myself didn't relish the idea of any semi-hostile government, such as the United Arab Republic then was, getting its hands on it. It was something that only scientists could handle, or engineers, not politicians.

But I put aside the thought as too disturbing, and opened the case. The machine glittered in the dark. I faced the lid toward the window, in the direction of the Museum of old, according to the best authorities, though nothing now remained of it. I turned on the machine and it duplicated the view of the harbor, being set for the present. I reached for the switch to start it going back in time...

I heard a noise and turned it off. There was a tap at the door. Did I wish an additional service, furnished by the hotel? No, I did not, I wished merely to sleep. Perhaps another night...I had made a poor choice of hotels. But the location was ideal.

I waited then till ten-thirty, then snapped on the machine. Now I turned the time switch on, and the quiet electric motor whirred the days backward, keeping the same daily time, so the night scene remained, gradually showing fewer lights, growing darker. It was soon before the age of electricity, and also the city became smaller. I recalled that Napoleon had found Alexandria a small town when he had come here in 1798, though a metropolis of a million before and since.

There was no indication of date on the time-viewer, but I knew I was rapidly going back through the years and centuries, as it grew darker, even the lighthouse flash disappearing. The machine was quiet and took little power from its batteries.

Darkness. I was tempted to shift the lever slightly so that daylight would replace night, but I refrained. Pitch-black for a long time, and then...

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A glow, a light, shining yellow and steady far out over the harbor. Alexandria is noted for more than its ancient library. One of the Seven Wonders of the World—the lighthouse, called Pharos, shining its message over the dark Mediterranean. I thrilled to see it. Wouldn't you?

The lighthouse had been wrecked in the Dark Ages (how appropriate!) so I was coming toward my goal. The light burned steadily, as time moved back, sometimes flickering out, but returning brighter than ever. It was supposed to be on a 400-foot tower, at the end of a peninsula on the island of Pharos, merely a huge open fire on top, but a wonder nevertheless. I estimated that I was now about two thousand years in the past. There was infrared to see in the dark, but I changed the daily setting so that it synchronized with an earlier, daylit hour. The screen's brightness dazzled me, before I turned it down.

I glanced out the window of the hotel apprehensively. The distance to the nearest building, across the street, reassured me. I didn't want to attract attention to my hotel room, with what might seem like a flickering television set, when there was none installed in any of the rooms.

Now the daylit city of ancient Alexandria spread out before me on the screen. It was before the time of the destruction, but of course it had been rebuilt several times. I pressed on further back, trying to fix it at about 250 B.C., the time of Ptolemy II Philadelphus. So I went back, saw the lighthouse in the process of construction, then went forward a couple of decades.

The golden age of Alexandria—I was there! The city lay before me, a brilliant jumble of domes, columns, obelisks, statues, temples, palaces...but I was not here to admire the view. Where was the Museum and library? I had to stop now to familiarize myself with additional controls on the machine. I had memorized the instructions. Separate levers swung the view left, right, up, down, closer and farther. The focus was always perfect. Walls did not stop it. No wonder this machine had military value! I supposed there were other limitations, besides short range (about a mile for detailed viewing), but I was only concerned with those that hindered *me*.

Beyond was the harbor, cluttered

BILL VAUGHAN *Astronomers report huge galaxies of stars which are going away from the Earth at a speed of 90,000 miles a second. Do you suppose they know something?*

galaxies

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with shipping, strange little antique ships with both oars and sails, colorful beyond description. The waters were picture-postcard blue. To the right in the distance sparkled the Royal Palace, with its Royal Harbor before it. The streets were crowded with people of every description, even the Greeks and Macedonians not being in the majority—Egyptians, Jews, Persians, Nubians, East Indians, a cosmopolitan throng in a variety of garments. The streets were wide and the city was rich...

And here was the library—or rather the Museum buildings—a vast complex of fine architecture housing the educational institution known as the Museum, dedicated to the service of the Muses, the first university in the world, of which the library was only a part. The library itself was concentrated in a group of massive buildings right in front of me. Some of it extended below me in fact, and I could look straight down on tile-floored rooms and stone-paved corridors.

One room was particularly interesting—it was large, well-lighted by skylights, and occupied by fifty or more scholars, talking, reading, and working over manuscripts. Some of the manuscripts were in Greek, I saw, and others in Hebrew. This could be the *Septuagint*—and probably was. Ptolemy II Philadelphus had commissioned the first translation of the Old Testament into Greek, and it was done right here by Jewish scholars who were residents of Alexandria. Seventy of them, if we are to take the word "Septuagint" literally.

The Hellenistic Age—a period of extension of culture, unlike the Hellenic Age before it, which originated most of that culture. A period of accumulation—great thinkers, great writings brought together—a small preview of the world civilization of today, which feeds upon itself and expands. The first two centuries of Alexandria were also somewhat creative, as scientists and historians worked here, but later it deteriorated into mere copywork, and Alexandria was more noted for retaining knowledge than for discovering it.

The copyists were here, too. I saw a room filled with young men who were listening to a speaker read from a scroll, and their pens worked in unison. The ancient equivalent of the printing press—I hoped there were proofreaders, too. I focused on what they were copying, but it seemed to be only a text on alchemy. I took a microfilm of what I could see.

This was the trouble. Only a small portion was visible to me, of the vast store of knowledge before me. Most of it was on shelves, in inaccessible scrolls, enclosed in cases and hidden until taken out and unrolled. Must I wait till each one is taken out, to copy it?

I remembered that I had complete control of time, and took comfort in that fact. If I wanted a certain scroll, I had only to focus on it, move the viewer through time, and watch the scroll until it was taken out, then follow it, watch it being unrolled. But...

There were at least six buildings, of

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six or eight rooms each, housing the library. Each room was lined with shelves, each jam-packed with scroll cases, or with loose papyrus rolls (perhaps these last were the newer, or less important works). The total number must have been enormous.

The estimate of nearly three quarters of a million rolls, by Caesar's time, could not be far off. Even now, two hundred years earlier, with the library just getting started, there were supposed to be over a hundred thousand. Ptolemy Philadelphus had assiduously collected books from all parts of the ancient world, and had many more copied and translated just for the library, as well as many writings originating here. I winced as I thought of all this going up in smoke. I saw the place as a firetrap—but it had endured until 48 B.C., somehow. Few candles, lamps or torches were permitted, I noticed. There was ample light, from skylights, during the daytime, and the library was probably closed at night.

Every scroll and every shelf was numbered, by the Greek system. Before they had Arabic numerals, the kind we use, before even the Roman numerals, the Greeks had a system too, little known now. They used letters of the alphabet, the first nine starting with alpha representing the numbers one through nine, the next nine letters standing for the numbers ten through ninety, and so on. They could build up a fairly large number without the use of zero, a later invention. But this system meant nothing to me without a key to it, and this I had to find first.

So I hunted for the catalog of Callimachus, the most famous librarian of Alexandria, and was rewarded by finding Callimachus himself, checking his stacks, with a horde of assistants. He was a nervous little man, darting in and out, snapping instructions, and giving the appearance of being driven crazy, pointing at books out of place, correcting errors—can't you just imagine him?

By use of his catalog (a work in progress) I got a general picture of where everything was located, but this knowledge almost defeated me. It overwhelmed me. How could I begin to copy or even glance at the tiny fraction of it exposed to view? Which material was actually lost (besides the catalog itself) and so worth copying? How much of it was worth copying anyway? Some of the ancient writings were pure gold, but one has to go through an awful lot of gravel to get a bit of gold.

Time was on my side, but time was against me, too. I had a span of two hundred years to search the library, but how many days, hours, did I actually have? *My* time was limited, regardless of the length of ancient time available. I was not a secure savant in an ivory tower. I was a furtive tourist in a hotel room.... And on this uneasy note I looked up from the machine and saw the brief Egyptian dawn was breaking.

I couldn't continue this in the

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daytime. I feared the intrusion of the clerk, the maids. Only when I was supposed to be sleeping, was I safe from them. The suitcase itself would be safe enough, locked, I hoped.

I shut off the machine, put the suitcase away, and crawled into bed for needed sleep. But I couldn't allow myself to sleep too long. It would

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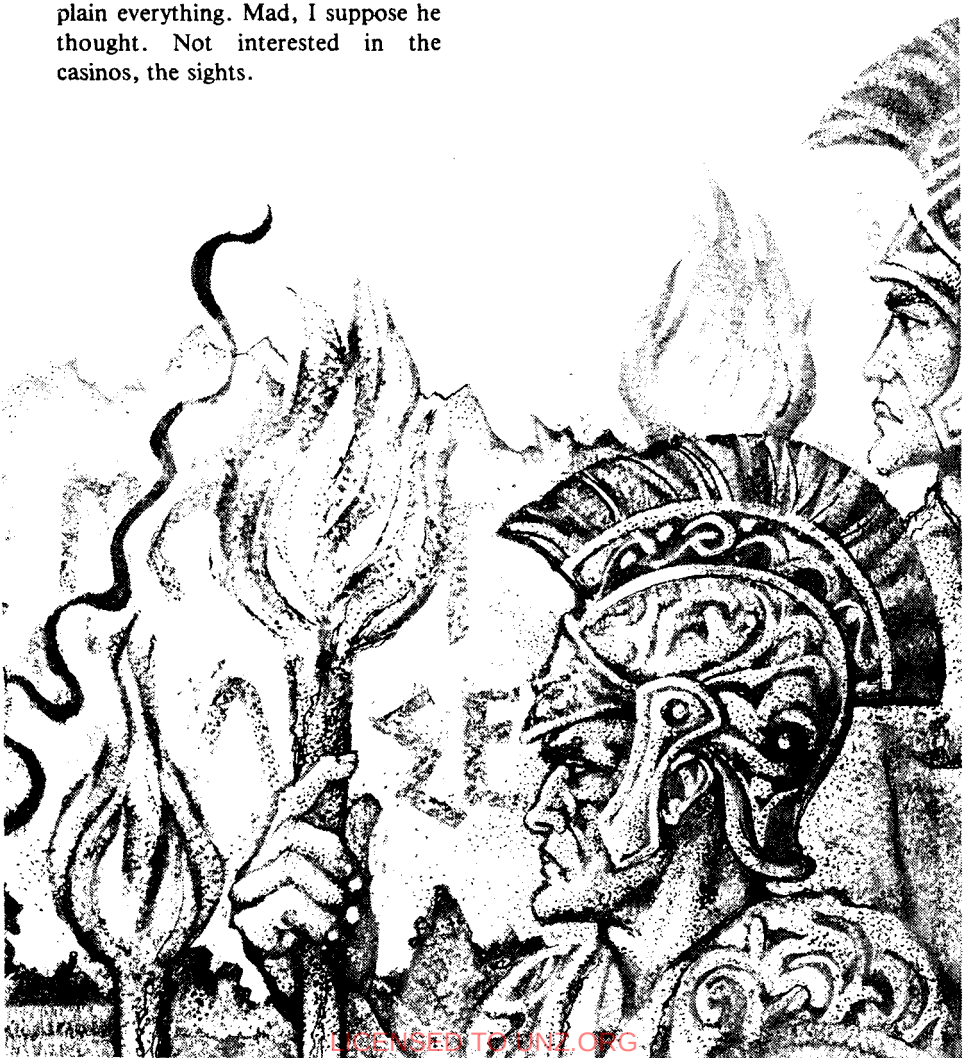
look strange, after retiring early. I didn't sleep long anyway. At seven I got up and dressed, bid ancient Alexandria goodbye and went down to modern Al Iskandari'yah.

I found the same clerk, still on duty, and he greeted me familiarly. "Did you sleep well? Were you disturbed?" and so on. We chatted for a while, I told him I was an archaeologist, and this seemed to explain everything. Mad, I suppose he thought. Not interested in the casinos, the sights.

"I'll just walk around," I told him, rejecting his offers of guide service. I prefer to dispense with guides in strange cities. I never concentrate too much on seeing the standard sights, and if I get lost, so much the better. I usually stumble onto something interesting. The hotel had no food service, so I went out into the sunshine.

The sea breeze was refreshing,



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after the heat of Abu Simbel, and the oppressiveness of Cairo. After breakfast in a small café, I walked toward the harbor, along a wide avenue bordered by palm trees. I wasn't much interested in tourism, but this historic city fascinated me. I almost expected to see galleys on the water, but hordes of pretentious motorboats took their place. I walked along the promenade, found a reclining chair (two piastres rent) near the yacht club which had magically replaced the Royal Palace of the Ptolemies. The first thing I knew I had slept several hours. I permitted myself to doze off again, and woke somewhat refreshed.

I walked back through the city, its crowds less cosmopolitan and more Egyptian than its ancient counterpart, but its gardens, villas, mosques and public buildings no less spectacular. I visited a casino or two without gambling, sauntered through the markets without buying anything—but I was almost tempted to buy, once, in a bookstall in Liberation Square.

Most of the books were in Arabic, of course, but I found a copy, in the foreign section, of Ritschl's *Die Alexandrinischen Bibliotheken,* with even a map of ancient Alexandria. It was slightly off—but only *I* knew that. And I realized I had better not carry this book back to the hotel with me, to be found and give a clue to my purpose. I browsed through the few books in English I could find—mostly paperbacks with titles like *Soviet-Arab Accord* and *Nasser Speaks.* There was a James Bond mystery I hadn't read, but somehow I didn't feel like reading about spies, just now.

I wondered how my suitcase was doing. I had purposely stressed "archaeological books" so that no one would be much interested. Nothing is thought more dry than archaeology, I hear. But I could not return to see if the maids had discovered the machine. I must act like a tourist. Carefree, even if I wasn't.

I walked through an interesting park, an open-air museum of Greek and Egyptian statuary, some of which I recognized as having seen when new. I sat down on a park bench and immediately went to sleep. I dreamed of ancient Alexandria. When I woke it was early afternoon. I dined, walked till I was tired, slept some more in a cinema, then spent the rest of the time in the casinos. I won three Egyptian pounds, overall.

The night life of Alexandria isn't so provincial, but I wanted to get back to my hotel, and I found my way there about ten, disappointing the clerk on seeing me so early. He tried to sell me on the guided tour again, and startled me a little when he mentioned that they had given my room a thorough cleaning. "That suitcase, it is heavy. The maid had to have help." I felt he was watching me for a reaction, so I tried not to show any. What would James Bond have done?

He was delighted to hear that I had visited the casinos, at least, but I slipped once and admitted dozing in

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the beach chair. This raised his eyebrows, and he said, "You did not sleep well last night, eh? Perhaps you would like a quieter room?" I tried to make my refusal casual.

I sat around a while in the hotel lobby, found an English language newspaper, the Paris *Tribune,* an old one. A minor headline caught my eye, 24 LOST IN AIR CRASH, NEAR ROME. Idly, I read the casualty list. . . *Fagerquist, Karl.* This stunned me for a while. I scanned the rest of the months-old news unseeingly, and it was eleven o'clock before I stumbled up to my room.

As I turned on the time-viewer that night, I had the feeling of *now* or *never.* With Fagerquist gone (and I mourned his loss as a friend as well as a blow to my own dreams) when would there ever be another chance? This particular machine would break down soon enough, or be discovered and confiscated even sooner.

I had been kidding myself that I had all the time in the world. I had allowed myself a week, before the game would be up, so I had talked of a week's holiday. Now I felt it would be less than that. The clerk was already getting suspicious.

Should I try to get away *now,* with the machine? No. I could never get it out of the country, and would be instantly suspect for leaving so early. I would play it out here, for the week, then make for Cairo, stash the suitcase somewhere—in Pharaoh's tomb, if necessary—and get away with the microfilms. I was sure I could manage this.

In any case, I had to have microfilms to get away with. And I hadn't taken many so far.

So I put all of this out of my mind—if anything so disturbing can be put out of one's mind; it lurks there below the surface, causing a vague feeling of uneasiness. I wandered, via the viewer, around the fabulous library. There it was in all its glory and disappointment. Shelves and tiers of shelves, cases and cases of rolls. The lost knowledge of the ages, soon to be lost again, unless I *did* something.

But I couldn't get at the books, without a lot of preparation. I had to look up a particular roll I wanted, consult the catalog, then find the shelf and roll, and wait. No, I didn't really have to wait. I could move through time rapidly until the roll shifted, then I knew it had been taken out. Then backtrack, and follow it until it was unrolled—and hope the reader was facing the right way, so I could look over his shoulder. I could only record what I could see. Theoretically, I could read all the books in the library this way—if I had time enough.

I didn't know which books I really wanted—what exactly the lost ones were. Callimachus' catalog helped some—but I had to have a modern comparison. It might take years, with a corps of scholars and/or computers. This was a great project—for an army.

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The word "army" brought my uneasiness to the surface again. Should I take the safe way out, and just throw the suitcase out the hotel window? It ought to make an unrecognizable splatter, and not get me into too much trouble.

But I *couldn't.* Not while I saw all those delectable volumes before me. Occasionally I saw one change position, showing that it had been taken out and replaced; then I chased it and watched it unrolled. Often something too trivial to bother with—but how was I to know that? I searched for the more important lost works that I knew of—for example, Ptolemy I Soter's history of Alexander's campaigns—an eyewitness account. I recorded it, finally, and found it disappointingly brief. This was the same Ptolemy who once asked Euclid for a digest version of the *Elements,* and was told there was no royal road to geometry. He might have found the royal road to publication, though.

I went forward in time about a century, looking for the works of Hipparchus. I had wasted time looking for them before, forgetting for the moment that Hipparchus, champion of the geocentric theory and maker of the first star catalog, flourished about 125 B.C., could not have had any works in the library in 250 B.C. Hipparchus was important because he was the lost source of much of the material of Ptolemy (not the king but the astronomer, Claudius Ptolemaeus, who was of an even later period). I left the time of Ptolemy II Philadelphus, without regrets (because I couldn't afford time for them) and I never saw it again.

The library, *circa* 125 B.C., had fallen upon evil days. The following five Ptolemies had gone to seed, and so had their city. Alexandria was still splendid, and so was the library, but it was noticeably decadent. Little things told me this—the floor was untidy, the shelves jammed and chaotic, there were few readers and fewer copiers. Picture the outer reading room of the main public library of any modern American city, used (as it sometimes is) as a place for transients to come in out of the cold and read newspapers...

I found the astronomical works of Hipparchus in a dusty corner, and I knew these were worth copying, if I could get at them. Here was the original source for Ptolemaeus' *Syntaxis,* which became the *Almagest*—a Latin copy of an Arabic translation of a Greek summary, which was nevertheless the scientific bible of the Middle Ages. Much is lost in translation, more in copying and summarizing—and here was the original. What had Hipparchus really said?

I never did find out—because I couldn't get at the damn rolls. No one took them out.

Most of the readers here were interested in trivia—the latest court dramas and gossip papers—the equivalent of modern romances and scandal sheets. The court of Macedonian Egypt was a hotbed of intrigue anyway, so the writers didn't have to embellish much. This was also an era

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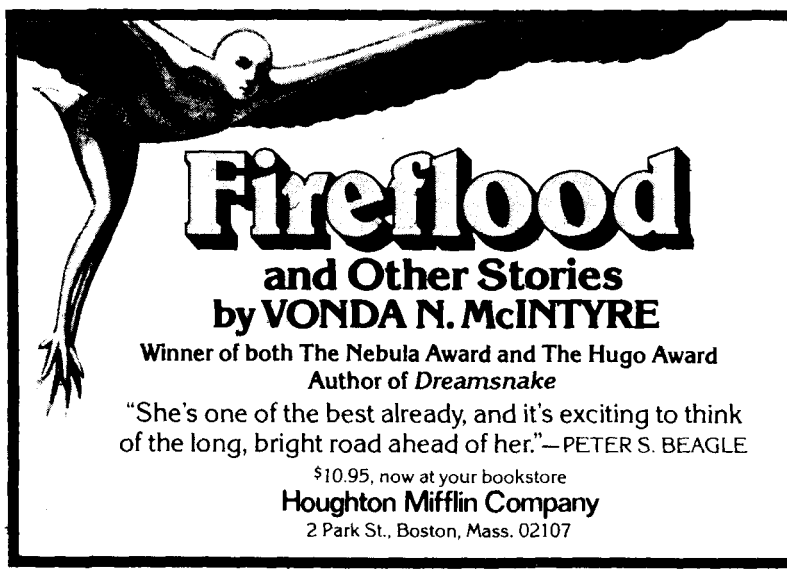
of religious controversy, which wasted papyrus by the galley-load. But the gold I wanted was here—somewhere.

Nearly half a million scrolls by now. The Hellenistic Age almost competed with the modern era for burying worth under trash.

I kept searching, without quite knowing what I was looking for. You know this confused feeling, just prior to giving up. Well, I was not about to give up. I longed for Fagerquist's promised improvements—to "retrieve the artifacts," as he put it. I imagined myself extracting the rolls I wanted, at will, unrolling them swiftly for the camera; or better, bringing them forward in time to be studied at leisure. Now this would never be possible. I almost believed that Fagerquist could have done it, had he lived.

I went back to the exasperating method I had been using. Copying scrolls as unrolled was a slow process, and required patience. Time was limitless, but my time wasn't. I also took films of the library itself, and its people, feeling in a moment of despair that this was all I would ever get—a fascinating sight, but not enough. I recorded the writings that were open to view through the workings of chance. When the dawn began to light up the hotel room, I was still filming, having found a workroom of scrolls being mended and thus exposed, but I felt I hadn't gotten anything worthwhile on my films. I switched the view to the city of 125 B.C. for a minute. Not much different from before, busy and bright (the an-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cient day was now out of synchronization with the "real" day). I shut off the machine and put the suitcase away, discouraged.

The morning air perked me up a little, out on the boulevards. I had avoided contact with the clerk—perhaps I shouldn't have, but I couldn't have borne his inquiring whether I had slept well. I took a brisk walk downtown, a bus ride around the city, attempted to relax, but spent most of the time planning and worrying. The bright scenery of Alexandria scarcely penetrated my consciousness. Camp de Cesar, Pompey's Pillar, Lake Mareotis, I could hardly tell you what I saw there. At the new harbor I was tempted to board a freighter loading bales of cotton. I had to get away, but not now. I had to take the machine away with me, not abandon it in the hotel, leaving it for the Authorities to work over. They might discover its uses, and use it for...what?

The police-minded Egyptians might use it only in police work—a legitimate enough use—but then again, it might be a temptation to use it to better their international position—and how long would they then have it to themselves? How long could any government keep it secret? I wished I had taken it to the American Embassy in Cairo, or better, the Swedish Embassy. But I had not, and it was here, in the city of Hero and Nasser. An archaeological tool, and an excellent spy-machine. In the wrong hands—but of course it would get into the wrong hands. Doesn't it always?

I must destroy it, I thought, more nervous than ever. Why did I bring it here, endangering the security of the world? But I couldn't have gotten it through customs and out of the country anyway. I itched to get back to the hotel, but I couldn't go back right then. Can you imagine someone basking in the bright sunshine and cool Mediterranean breeze, burning up with fear and anxiety? I suppose you can...

Eventually the long sunny day passed, and the even longer-seeming balmy evening. I visited my room once before dinner, to shave, and took the opportunity to glance at the suitcase. It had been disturbed, I determined, but not unlocked. It was now a terrible burden to me. I longed to get rid of it, despite its fantastic attractions.

After dinner I tried my luck in the casinos and found it bad, walked around the semi-lit streets, uncaring of danger, though possibly safer than on some of the streets of an American city.

Some distance from the hotel, I stopped in at a little Arab café, packed with coffee-drinkers and backgammon players, the monotonous wail of Arabic music soothing to me in my troubled state. It gave me a chance to think. I must get away from here, early tomorrow, I thought, find any excuse. Perhaps rent a car to drive to Cairo, bury the machine in the desert, throw it into the Nile, anything. Save only the microfilm.

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But first—I wanted to get more films of lost manuscripts. The scientist in me would not let go of that—I suppose if I were an engineer I would care more about the machine itself. But if I got some good manuscripts on microfilm it would make it all worthwhile. Get them recorded, before they were lost for good. Get there before the looters, Fagerquist had said.

This gave me a new idea. The looters. The so-called Alexandrine War, in Julius Caesar's time, was actually more of an insurrection. Alexandria had been in civil turmoil, just before the fire. I hastened back to the hotel.

I got into another long argument with the clerk, this time on the comparison of Alexandria with Cairo. I agreed with him on the virtues of Al Iskandari'yah, then it turned out he was a Cairene...

I wanted to test my theory, but I couldn't seem to terminate the conversation. It's hard to pretend to be merely tired and sleepy, when one is burning with anticipation.

It was nearly eleven o'clock before I could get away and up to my room. I locked the door, and put on the chainlock this time—that ought to slow them down, I thought. As usual, I practiced with the suitcase, lifting it out, placing it on the bed, opening the lid, then, quietly but swiftly closing the lid and moving the case to the closet in one smooth action. I had it down to three seconds, not including smoothing the bedcovers afterward.

How could I leave Alexandria, when I still hadn't found what I wanted? I changed into my pajamas, turned out the light, pulled up the blinds—the harbor was gloriously lit, the shoreline like a string of sparkling diamonds—stirring my sense of adventure and dispelling my depression.

I got into bed, kicked the bedclothes around, smashed the pillow, and got out again, quietly. I brought out the case, and again practiced stowing it away, in the dark. Then I opened the lid, and turned on the machine. For the last time, I felt.

I looked at the old Alexandria for a moment, switched to the nighttime scene. The lighthouse of Pharos, flaring far out over the dark waters. I held the forward time-lever down, until the lighthouse flame went out, momentarily replaced by a sparkle of flashes all around the harbor, then a quick bright universal glare, then blackness. I stopped, went back a bit, and time began moving ahead normally.

Dozens of raging fires dotted the harbor. The Egyptian fleet, set afire by Julius Caesar. It was 48 B.C.

I watched the burning ships for a while, saw that none of them were drifting close to shore, and switched to the library, below me.

It was dark inside, and I turned on the infrared. The library had been tastefully redecorated since Ptolemy VII's time. There were more scrolls, but fewer places to make and copy them. In this era, the past was already more revered than the present. There seemed to be more neatness and order, but it remained to be seen whether that would be any

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help to me in my present situation.

The library was empty of people. Of course the hour was late, as I was now synchronized with current time, but I didn't set it back to day or early evening. The customers and attendants had obviously fled—because this entire district was given over to rioting and war.

Egyptian and Roman troops were fighting—it would take some time to explain just why. Caesar had come to Egypt while chasing Pompey, after the battle of Pharsalus; and coincidentally, Cleopatra and Ptolemy XII, a mere boy, were fighting for the crown of Egypt—not too independent in these days of Roman expansion. The Romans were now besieged in the Royal Palace, by a mob of angry citizens and Ptolemy's troops, because Caesar had "decided" in favor of Cleopatra (wonder why?)—and it gets worse. Suffice it to say that Alexandria was a battlefield.

That's what I wanted. I remembered the words of Fagerquist, "get there before the looters." But I wanted, this time, to get there *after* the looters, so I could get at the books myself.

But I was disappointed. Search as I would, I couldn't find a book out of place. The shelves were packed with scrolls, papyrus and parchment, Greek and Latin, neat and orderly—but there were none open for me to read. I saw the labeled rows of scientific works, many of them lost now, or curtly summed up in other works. Here were the originals, old even in Roman times.

I scanned the library and found it completely abandoned, perhaps through an ample warning, giving them time to—damn it—put the books away. I turned the view to the outside of the building—clear as daylight in the infrared. The quarter was deserted and apparently dark. Here and there were a few people, running or skulking, alone or in small groups, and an occasional gesticulating mob, making for the harbor area. I watched them closely, but they did not approach the library, most of them heading toward or away from the object of their wrath, the Royal Palace now occupied by Caesar, anathema to Egyptians at the moment.

I shifted the scene, watched the burning fleet, which didn't seem to be getting any closer to the shore, then back to the darkened streets. I saw now a man striding purposefully and fearlessly along, toward the library, a man dressed in a tunic, metal armor around shoulders and chest, short sword hanging from a strap, and a military bearing that proclaimed him a Roman soldier. An officer, probably, by the crest on his metal helmet.

He came inside the library, coming through a door just below me that I hadn't noticed. The museum buildings were so vast that I had not fully explored all of them, and perhaps this had been added or changed since the last time I had looked, seventy-five years in the past.

The room below me was an architectural showpiece, with tiled walls and oaken shelves, and it was in

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the process of being ransacked. A dozen Roman soldiers, by the light of torches—held carelessly by other soldiers and watched nervously by me—were methodically looting the place. But they weren't taking anything, or piling it up for later removal, and it seemed a mere act of vandalism at first.

One soldier, mounted on a table, would reach up to the shelves and throw down a scroll case to one of the others, who would in turn open the cylinder, and with a swift, practiced motion, unroll the scroll out into the room to its full length or nearly, then shake the case, and throw it down. They were doing this in an efficient, military manner, and the condition of the floor showed they had been at work for quite some time—long strips of papyrus crisscrossed the room knee-deep. The men with torches (instead of watching their torches) watched the procedure, and their faces showed disappointment, and so did all the others'. I guessed what they were up to, now. They were looking for treasure, in the rolls and cases, just as modern thieves search books for hidden money. Just what they expected to find I didn't know, but they were obviously not finding it.

The newcomer talked a while to another officer, who gave an order, and the others dropped their work, the one on the table came down, and they all marched outside, taking their torches with them (to my relief), leaving the room in darkness—except for my infrared, of course. Outside, instead of marching away, they were disposed around the library as guards.

I now understood—finding no loot, they were ordered to guard the library from looters. Perhaps the orders had come from Caesar himself, at the request of Cleopatra—to save the precious library, one of Egypt's national treasures; and the officer had just brought this order from headquarters. This made sense—Cleopatra was the one who years later asked Mark Antony to replace the destroyed library with one taken from Pergamum.

But this was 48 B.C., the Alexandrine War was on, Julius Caesar was holed up in the Royal Palace, and Cleopatra had been smuggled in to him rolled up in a rug. I wondered what they were up to. The Palace was not far away, on the edge of the harbor, if I wanted to take a peek at their antics, but I had no time for that now.

Below me was treasure—treasure undreamed of by Fagerquist, unrecognized by the heedless Roman soldiers outside. I had glimpsed a name in the glare of the torchlight—*Sophocles*—and the labels on the half-vacant shelves told me that this was the new main room of classic Greek drama.

What cared I for Greek scientists? Most of their theories were wrong anyway. *This* was the lost treasure of Alexandria. The Greek dramatists—especially the near-contemporary constellation of Aeschylus, Euripides, Sophocles, and the comic

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Aristophanes. Aeschylus is supposed to have written more than ninety plays, only seven of which have survived. And the others about the same. What if Shakespeare were represented by only ten percent of his works? Wouldn't we be overjoyed to discover the rest?

The sight of all those precious rolls spread out on the floor, several feet deep, both dismayed and thrilled me. It was the opportunity I had been waiting for!

I started the microfilm recorder. Almost all of these would be new, so I need not be selective. I chuckled at the thought of "new" Greek classics.

It was all in Attic Greek, but Greek is almost English to me, and I had no trouble making out the scrolls except where they were twisted away from me, or hidden below others, or incompletely unrolled—sometimes creating a doubt as to how a sentence ended. But there was always more to record, as the soldiers had done a thorough job, in their search for hidden jewels or gold.

I felt almost like a desecrator myself, though I was disturbing nothing, and I knew that soon the whole library would be destroyed anyway. To give me more time, I slowed the viewer down, to half normal time-speed. I could then scan more volumes in the little time remaining before the fire.

I wanted to get them all—all that were so fortunately exposed to view, though I knew I couldn't even do this. I felt sure that the Roman soldiers would not be back, and that they would keep others out until the fire—how long did I have?

I switched the scene to the outside, the harbor. The burning ships were no nearer to shore. Some of the hulks were burned down to the waterline, others must have sunk, as there were fewer of them. I had some time left, but not all night—I had definitely ascertained that this was the night of the conflagration.

Back to the library and recording in earnest. As I recorded I couldn't help but read. Sophocles in the original! Here was *Oedipus Coloneus,* unrolled for my inspection. *But all things else melt with all-powerful Time.* And here were *Ichneutae,* and *Creusa,* lost save in fragments, lost for two thousand years. What a harvest my microfilm was gathering! My elation was only tempered by the words of Sophocles I was reading: *If any count on two days to come, he is a fool; for a man has no morrow, till with good luck he has gotten through today.*

I looked at the vast area of papyrus, and despaired—even what was here exposed would take days to record. I slowed the viewer almost to a stop. I read in hasty spurts, as I swiftly moved the field of vision. I was so absorbed by my task that I didn't at first understand when there was a knocking at the door. A knocking?

I snapped back to reality, to modern Alexandria, to the hotel room, my head swimming. The knocking continued.

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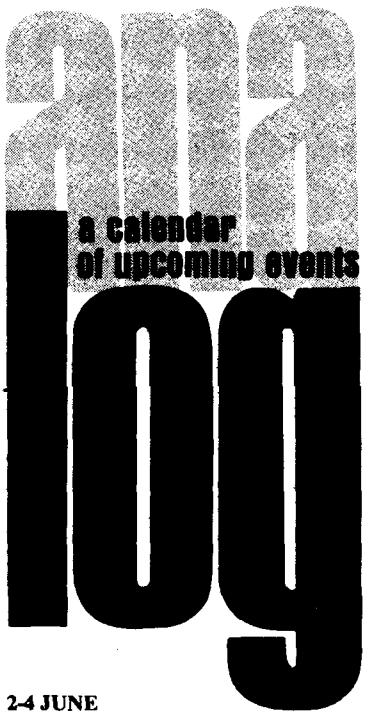

2-4 JUNE
Conference on the Chemistry and Physics of Coal Utilization at Morgantown, W. Va. Info: American Physical Society, 335 East 45th St. New York NY 10017.

13-15 JUNE
AD ASTRAE (Toronto regional SF/Fsy conference) at Toronto Ontario, Canada. Guest of Honor—James P. Hogan, Fan Guest of Honor—Steve Simmons. Registration: $8 until 1 June, $10 thereafter. Art show: Elizabeth Pearse, 218 All Saints Cres., Oakville, Ontario, Canada L6J 5M9. All other info: Ad Astrae, c/o 2010-88 Bloor St. East, Toronto, Ontario, Canada M4W 3G9.

18-22 JUNE
Science Fiction Research Association (international organization for people who teach courses in science fiction) annual convention. Info: Thomas Hamilton, Wagner College Planetarium, 631 Howard Ave., Staten Island NY 10301.

20-22 JUNE
Fifth Annual Computerfest of the Midwest Affiliation of Computer Clubs, at Franklin University, Columbus Ohio. Rooms at Holiday Inn, downtown Columbus near Franklin University. Meeting for all interested in personal computing or small business computing. Workshops. Info: James Crowley, 4008 Rickenbacker Ave., Columbus OH 43213. 614-239-9931.

4-6 JULY
EMPIRICON II at Prince George Hotel; 14 East 28th St., New York City. Guest of Honor—David G. Hartwell, Fan Guest of Honor—Marc S. Glasser. Guests: Isaac Asimov, Hal Clement, Samuel R. Delany, Barry Malzberg. Registration: $7.50 until June 21, $9.00 thereafter. Info: Empiricon II, P.O. Box 682, Church St. Sta., New York, New York 10008

29 AUGUST-1 SEPTEMBER
NOREASCON TWO (38th World Science Fiction Convention) at Sheraton-Boston Hotel and Hynes Civic Auditorium, Boston, Masstts. Guests of Honor—Kate Wilhelm and Damon Knight, Fan Guest of Honor—Bruce Pelz, Toastmaster—Bob Silverberg. Registration: $30 until 1 July 1980, nonattending membership $8 at all times. This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks, panels, films, fancy dress competition, the works. Join now and get to vote for the Hugo awards and the John W. Campbell Award for Best New Writer. Info: Noreascon 2, P.O. Box 46, MIT Branch Post Office, Cambridge MA 02139.

ANTHONY LEWIS

*Items for the Calendar should be sent to the Editorial Offices, **four months** in advance of the issue in which you want the item to appear.*

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I was fit to be tied. I had been scanning something exciting, the first "new" comedy of Aristophanes I had seen. The knock was insistent, and my exasperation changed to dismay. I saw by my wristwatch it was three A.M. Quickly I snapped off the switch, shut the lid and started to lift the suitcase from the bed, but it was too late. A key was turning in the lock.

They burst in—the chain fell away, obviously tampered with beforehand. It was the clerk, and with him an Egyptian policeman. They snapped on the lights, and I blinked. I was caught red-handed. I leaned on the suitcase, breathing hard.

The policeman was sarcastic. "Packing?"

I had been about to say that, but I knew it wouldn't hold water. So I opened the lid, revealed the machine. The lieutenant—he identified himself as an officer in the State Security Police—didn't know what to make of it. Neither did the clerk, who tried to look too.

"It's a camera," I said lamely, and instantly regretted it. The lieutenant stiffened, looked out the window, where the harbor lights still sparkled.

"Tourists are requested not to take pictures of military installations, factories and public works," he quoted the guidebook, verbatim.

"What installations?" I asked innocently. The James Bond stance did not suit me, and I grew exceedingly nervous.

"The lighthouse," said the officer. "Is that not a public work? You have been observed the last three nights, watching television, all night. There is no television in this room. This camera..."

"This camera," I said, with sudden inspiration, "photographs only papers. It copies manuscripts, on microfilm. Then it shows them on the screen." I snapped on the switch. There appeared an old Greek manuscript, filling the screen with the words of Aristophanes. How fortunate I had not changed the picture when I shut it off. What if there were a view of the burning ships—how could I explain *them?*

The lieutenant was confused now, seeing some truth in my argument. He could not read the writing, but he could see it was Greek. I came to his rescue.

"It's something I picked up in Cairo Museum. It's a microfilm of a manuscript there. I'll read it to you." I wanted to memorize as much as I could, before he confiscated the machine, as I knew he would—why had this happened to me, just at the moment of victory? "It says, in Greek, *Heed not the fool who laughs too much at your comedies, but beware the official who does not laugh...*" I stopped, not liking the way he looked.

"What are these levers here?" he asked. "This is an odd kind of camera...." He started to poke at the levers, but refrained from actually touching them. He waved me back as I tried to interfere.

He turned to me, a stern glance keeping the clerk from touching

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anything. We argued. He was winning. After all, he was the law. He said my light was seen the first night, said they knew of the heavy suitcase and were suspicious of it, said I had acted suspiciously by not seeing the sights of Alexandria, admitting I had slept in the park. The clerk nodded vigorously.

I started to bluster, then looked past the officer at the machine, as I saw movement on it. I cried out in alarm.

On the screen, the picture of the Greek manuscript was changing. The edges were curling, it was turning brown. I leaped forward; the policeman prevented me, and grabbed for the machine himself. I tried to pull him away, first to prevent him from touching it; then to save him, as the machine spat flame and smoke. All three of us got out of the room, as the suitcase blew up, in a pyrotechnic display of sparks.

The firemen of Alexandria are very efficient. They managed to restrict the fire to the room, and the hotel was saved. All my belongings were destroyed, and of course the machine was burned beyond recognition. A good thing, under the circumstances.

I got out of Egypt with a whole skin and very little else. I was under suspicion of spying and sabotage, but I was exonerated. Since I was undeniably guilty of causing the damage—my story of a faulty microfilm reader was almost believable—I paid some damages and fines. My archaeological work and the intercession of fellow scientists—some of the best Egyptologists are Egyptians—saved me. I left for Rome and Stockholm, but I couldn't pick up the trail of Fagerquist. My inquiries revealed no partners, and only the information that he had been very secretive, and somewhat eccentric. That I already knew. I left for the States.

What actually happened in Alexandria? I figured it and refigured it, and could come up with only one solution. When I had shut off the machine, it had been focused on the open scroll. The time-viewer had been slowed to a crawl, the light was infrared. Infrared is heat, you know. The floor of the ransacked room in the library was cluttered with dry papyrus scrolls, scattered about. When I turned the machine on again, the scene was the same, and the light stayed on too long in one place. The last view I had of the scroll, it was turning brown, curling...

Byron Pierce sighed, got up and walked to the bookcase, and the row of figurines. He picked up the statuette of the Roman ruler, chucked it into the wastebasket with an air of finality.

"Julius Caesar," he said, half to himself. "*You* didn't burn down the Alexandria library, that first time. *I* did."

At that moment, the buzzer sounded. Pierce answered it, disconsolately. "Yes?"

"There's a visitor to see you," said the receptionist. "A Mr. Gordon. He says he's an engineer."

Pierce brightened perceptibly. "Send him in," he said. ■

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GIVEN A,

then bee

In space, old problems will adapt to the new environment—which will require solutions to do likewise.

DEAN R. LAMBE

As soon as his partner's freckled face appeared on the phone screen, Derek Rayner began speaking: "Got it all wrapped up here, Carol. Got them epoxied solid on eight violations—lead, cadmium, nickel, and a couple nasty organics. Only lost about 1000 of the troups too; not a bad operation. Anything else come in for us while I've been down here amidst the alligators?"

Carol Tigue smiled. She had worked with the man long enough to ignore his exaggerations, and her reply was equally lacking in preliminaries. "Glad to hear the New Orleans water will be almost fit to drink soon, Derek. And yeah, something did. Top priority, but I'm not sure that we...well, you'll have to decide...you're the only one free for it anyway."

Rayner scratched his short, red beard and frowned into the phone camera. "What do you mean I'm free? I'm off to Phoenix tomorrow for that Foster plant job. Besides, the rest of the boys should be finished—"

" 'Fraid not, Derek." She flicked a stray wisp of blond hair away from her cheek. "Foster just called and cancelled; seems they found their Freon leak. And Bill's still tied up at that old nucwaste dump in Kentucky; he's pretty sure that it wasn't all cleaned out. Ted and Kaito think they'll be at least two more weeks in the wilds of Pennsylvania. They're not certain yet whether the gunk is coming from Steubenville or Pitts-

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burgh. So that leaves you, oh mighty chief, unless you want me to close up the hives and fly, of course."

Rayner grinned at their long-standing private joke. "Nope, the queen always stays with the hive, us workers know our place. So who's the new client...and he damn well better not be in a swamp!"

"Well, they're not a client, not yet. I didn't want to commit us without...but I can safely guarantee you no swamp," she chuckled.

"Come on, Carol, quit the clowning. Where're you trying to send me?"

"The digits are XO-2486-657-1773. Call and talk to 'em yourself. The man you want is Farley Gould, Director of Environmental Control. Call me back when you decide. Bye."

As the screen faded to colored dots, Rayner shook his head in puzzlement. Carol was a little zany, but otherwise a top-notch entomologist. And she was not usually this cryptic. He keyed the phone, more than a little intrigued at the unusual callcode, and was further surprised to encounter a human operator.

"Good morning. Willy Ley Space Habitat, Earthside. Who is calling, please?" announced the young Oriental woman.

"Uh, ah...ah, Dr. Derek Rayner, President of Beeline, Incorporated. But wait a—"

"Thank you, sir. And to whom did you wish to speak?"

"Ah...Mr. Farley Gould...but look, there must be some—" stammered Rayner, now no longer sure that the operator was human.

"Thank you. Please allow for approximately two seconds of transmission lag."

The psychobiologist could only stare in wonder, as an unusually static-ridden picture formed on his screen. The man looked about fifty, and sported a mustache as brief as his unfashionably short hair.

"Gould here. What is it?" the man said, with remnants of a British accent.

"This is Derek Rayner of Beeline, Inc., Mr. Gould, but I'm not sure I have the right—"

Gould began speaking as if he had missed his last words. "Ah yes, Rayner. Good of you to get back to me. You're the chap that does pollution monitoring with honey bees, right? Well, we've a bit of a problem here. We could probably handle it with our own equipment, but we don't have a lot of time. Some of my people seem to think you're a bloody genius and can solve our mystery soonest. Not too keen on the idea myself. The Council's given the go-ahead to call you in, so it's out of my hands. You are available immediately?"

Rayner's normally ruddy complexion paled slightly. "Ah, Mr. Gould, there must be some...I mean, you want me to come up there, in space? I've never been into orbit, and—"

An expression that might have been a grin appeared on the older man's face. "Now my boy, that's no problem these days. You're what? Thirty-five, thirty-six? In good health? Have our medicos check you over before

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boost; but the main question concerns your field equipment. Won't mass over twenty kilos, I trust?"

Rayner drummed his fingers on the phone console, and tried to collect his thoughts. "Uh, yeah, thirty-six...but, uh...mass?"

Perhaps it was just microwave static; perhaps the L-4 Habitat environmental director sighed. "Weight! What does your stuff weigh? We have to count calories, you know."

The fog began slowly to thin in the psychobiologist's brain, but he still felt victim of symbolic split-brain surgery. On one level, he provided rational answers; on another level he engaged in outlandish (outlandish indeed!) fantasy. Gradually, the former state won out. While the reputation of Beeline, Inc. was very good, business was not. There were certainly plenty of environmental problems, but the money to have them traced and analyzed, let alone controlled, just wasn't there—even when government and corporations were not working at cross-purposes.

"Well, uh, Mr. Gould, our spectrometers and gas chromatographs are fairly portable, but they'd come in over twenty kilos, and—"

"No, no, Rayner, our monitoring lab's top form in that area. We have all the latest gear. All you'll need is your specialized collecting stuff."

"Ah, then there's the question of how many hives I'll need; how large an area you want surveyed. One bee doesn't amount to much, but 50,000, plus comb, frames—"

The image on Rayner's screen seemed to redden and expand, a biological nova. "Damnit man, no bees either! I outlined all this to your Ms. Tigue. Didn't the silly bird brief you? Even if we'd let you pass our quarantine with living bugs—and I assure you, we would not, my people tell me that terrestrial bees wouldn't work here. Besides, I was given to understand that you often work with local beekeepers, that your techniques are adaptable to any hive."

As he stared out of his hotel room window at the humid smog over Lake Pontchartrain, Rayner controlled his own rising anger. He was intrigued with the question of why his bees would not function in the Ley Habitat. "No, sir, *Dr.* Tigue indicated that she had preliminary discussion without commitment. And I'd have to know more about the suspected problem."

Gould visibly retreated from the brink of anger as well. "Ah, yes. Quite. Just your sort, I understand. We have traces of heavy metals—lead, maybe mercury, even arsenic—and we can't pinpoint the source. Could be just instrument noise. You do understand, what with our closed environment, that even traces—especially mercury, which our catalytic scrubbers can't handle at all. Anyway, you can get concentrations of several thousand times ambient level from the bodies of bees, right?"

"Yes, that's often true, with von Frisch sample-pointing and the Lindauer memory transfer techniques, we

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can spot levels in pollen that low. But I still don't—"

"Good, then. And that equipment doesn't mass much, right?"

The bee expert rubbed his beard in frustration. Obviously, Farley Gould was not only used to getting his own way, he was adept at avoiding argument via hundreds of thousands of kilometers as well. Rayner felt that he was truly losing ground at light speed. "Well, no," he finally managed, "my marking gear and microsurgical instruments would come in under twenty kilos, but look, I just can't—"

"That's it, then. Your transport's all laid on. All you need do is get to the St. Louis airport by 0700 local tomorrow. You're booked on TWA for Nairobi, where you'll transfer to a German Shuttle at Kenyatta Spaceport, dock at Oberth Station, and catch the regular transporter to Ley."

"Nai...Nairobi?"

"Quite. You just missed the American Shuttle. Docked at Goddard Station a few hours ago. Have to settle for a Common Europe carrier, I'm afraid. They really aren't as spartan as all that. See you in about four days. Clear."

Rayner almost jumped from the communications console, and began to pace—as much as the small, poorly air-conditioned room would allow. He was not accustomed to taking orders, had been his own boss since he had finished his doctorate. "Just who the hell does this Gould...ah, damn," he muttered, as he briskly keyed his office number again.

"Carol, you get me into the most incredible things. Looks like I'm going halfway to the moon!"

"Thought you would, Derek. This is one job we can't afford to pass up. Need anything from the lab?"

"No, I'll leave the van secured here. Got a weight limit anyway."

His partner grinned, and her blue eyes seemed to dance. "Oh, well save a few grams for nylon or polyester briefs. I hear they're very rare, and well-appreciated by the ladies up there."

"You're kidding."

"Nope, you'll see chief. Have fun."

Rayner clung weakly to a handhold in the central Hub, a few meters from the docking module tunnel. A number of people literally drifted around him, although most of his fellow transporter passengers seemed to know both where they were going, and how to get there in zero gee. He was startled from his disorientation by a lithe, dark-haired woman who materialized at is left elbow.

"Dr. Derek Rayner? Hi, I'm Diana Vanzolini, Farm Manager 1st. Also chief bee-swatter and honey-licker. It's really an honor to have you here. I mean, I've read all the papers you and Dr. Tigue did in *Environmental Monitor,* of course, and I sure admire those techniques. I hope you'll be able to show me... hey, are you OK? Damn me, I'm just not thinking. Look, don't be afraid to admit your stomach's still several thousand klicks sunward, happens to everybody even with the pills. We'll

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get some gee on you in a jiff, just put your hands on my shoulders and go limp. Got to run you through Decon first, then check in with Director Gould in Spoke Three. You'll have 0.6 gee there; all the administrators are lightweights as we say on Ley."

He grimaced at his nausea and her pun, but followed her directions and took hold of her surprisingly firm shoulders. She kicked off the curved wall in the direction of a fifteen-meter hole labeled: Spoke Three. Decontamination and Customs. The young woman deftly transferred him to handholds inside the spoke; as they moved towards the first Decon chamber, he began to feel that he knew where "down" was again. But as gravity returned, social conventions vanished. Ms. Vanzolini started to shed her blouse and shorts.

Hand on her waistband, she noticed his expression. "Oh sol-flares, you're not a New Moralist, are you? I know that WestBloc has gone real pucker-assed, but that's just silly and impractical here. If you'd rather I—"

"No, I understand. I'm still dazed, I guess. Uh, where do I put?"

She finished undressing, and blushed slightly as she directed his gaze from her compact, yet ample figure to several slots in the wall. "Well, mine go in there, but yours are synthetic, I imagine, so they go in Non-Recyclable. And that compcomm on your wrist, and anything in your pockets should go in there."

By the time they emerged from the third, and final, delousing stage, Rayner was almost back to normal, and increasingly pleased that this appealing woman had been sent to meet him.

"Shorts or jumpsuit? Or you can have your own clothes back if you don't mind waiting a few more minutes, Dr. Rayner."

"H'mm, oh, no. A jumpsuit's fine, I don't have your legs. And make it Derek, please." He smiled as he watched her dress.

Dimples appeared in her cheeks. "Fine, and it's Diana, eh, Derek," she said with a small hesitation. "Sorry about the spun-paper undies, but we just don't have enough goat and cotton wool to go around yet." She glanced at the instrument she had retrieved from the Inorganic slot. "Woops, Director Gould will think I've lost you. We'd better shuffle along."

Shuffle they did, while forward became down, and the wall orientation changed. Rayner's meeting with the Director of Environmental Control was as brief and as one-sided as their initial phone contact. The younger man was not surprised to find Gould's aluminum and fiber glass office furnishings to be stark and functional.

"Ah yes, Rayner. Our Ms. Vanzolini has you well in hand, I see. Not too discomforting a trip, I trust? Well, you'll work with Vanzolini and her crew; I'll expect an update every day. How long do you think you'll be all-in-all?"

"I can't really say yet, Mr. Gould... normally, we'd expect clear results in three weeks, but that's with

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a known area and suspected source. Of course, I've also got to see your bees." Rayner paused again, less confident than he usually was with a new client.

Gould waved a large, scarred hand, as if to express dissatisfaction with Rayner's responses. "Quite, but if we know the source, we wouldn't have called you, would we? There are blips on Monitors 37 through 43; that's over half a residential section and most of an agricultural section, about 1.5 km of our doughnut in all. And you must think in terms of volume, not area.

"Now let me make this very clear: any time you save is critical. Naturally I couldn't talk about this on the open beam to Earth, and those few who know it here are keeping mum to avoid panic. But we've already got a couple of kids in the clinic. Medicos are pretty sure that it's heavy metals poisoning, and that sort of thing simply should not be happening here! Couldn't happen at a worse time either."

Director Gould scowled and then pushed forward two plastic cards on his desk. "Oh yes, here's your meal chit and access card to BESS. Vanzolini will fill you in, I'm sure."

He clearly perceived dismissal, and "Uh, BESS?" was all the psychobiologist could manage.

"The computer. Couldn't run this place without her."

As they descended through the remainder of the spoke, in what Rayner could not help but think of as an elevator inside a high-rise building, he stroked his beard with nervous fingers. "Why do I get the feeling that Gould doesn't like me? Does he have something against Earthsiders?"

Diana took his hand, then drew back quickly, as if startled by her own action. "Oh no, Derek, it's nothing personal, I'm sure. He's always a bit curt, and he's very worried about this pollution. All of us who know are, it's so unheard of here. Also I'm afraid he does think calling you was a waste of time and reaction-mass. But mostly, he's uptight about the U.N. vote on our status next month. Anything that might suggest a lack of self-sufficiency could jeopardize our move for independence, you see. And now this health problem, and calling in outside experts...." She paused as the car stopped, and Rayner felt his normal eighty-five kilos for the first time in over three days. Her dimples appeared again. "Well, I'm sure you'll be able to help us, and welcome to luna firma, east of the moon."

"What?" Rayner was more than confused, both from the nature of the problem that confronted him, and—on a more personal level—from the recollection of Diana's touch. Either I'm lost in the granddaddy of all jetlags, he thought, or else we've got some interesting instant chemistry working here.

"Sorry, another Habitat joke. Almost everything in, on, and about the torus came via mass-driver from the moon, even the soil, so naturally it's not terra—"

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"But luna firma." Rayner halted, as they stepped from the bottom of the spoke, and he took in the beautiful vista that gently curved away from him. He could see almost a kilometer in both directions, before the rest of the torus was lost around the bends. Several levels of farm plots were visible to his left—obviously with crops in various stages of growth. To his right, one- and two-story residential units mixed their pastel hues with fruit trees, roof gardens, and even a small lake. His voice lowered in pitch as he expressed his appreciation. "Ohmygod, the stillpix and video don't even come close, Diana! This is just wonderful. No wonder nobody ever leaves once they settle here."

She chuckled, and almost reached for his hand again. "Any Earthsider that doesn't immediately have that reaction, we kick right out the docking port without a suit. Come on, your quarters are about half a klick Rote...eh, that's in the direction of rotation, other way's Counterrote, of course. Not that we feel it at one RPM, but the bees do, and that helps. Oh, and speaking of my yellow stripes, do you understand now why your bees just wouldn't do, no matter what kind of genetic wizardry your Dr. Tigue performed?"

Rayner almost felt victim of sensory overload, as he tried to take in the totality of the Habitat, and keep up with her lecture on apiculture. His eyes followed her pointing finger—tempted for a moment to follow her upraised arm in the other direction to shapely shoulder and torso. As he viewed the overhead "sky," it was several seconds before he understood. "Oh, I never thought of that! There's no sun!"

"Yep, well, there're lots of suns, really; each window panel gets light

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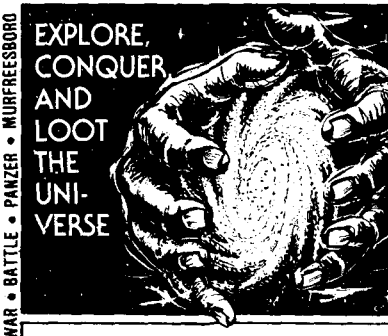

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from the big primary mirror that's angled north of the Hub, but via individual secondaries on the Hub side of the shell. That way we get plenty of light, but no other radiation or high-energy particles get through the shielding."

"I'll be damned. I was thinking in terms of gravity, or atmospheric differences, but no sun! So how the hell do your little stingers find—"

"Oh, you'll see, Derek." Her smile seemed to express more than professional enthusiasm. "And don't think gravity, pressure, and even Coriolis acceleration didn't bother the bees at the beginning.

"I was just a kid, a Farmer 3rd, when we first established the hives, and it would have been hilarious—if everything about our environment didn't have to be taken so seriously. I've read that the engineers who first conceived our Stanford torus over thirty years ago thought honey bees would be a great idea. But those nuts-and-bolts types sure didn't know a bee from a blueberry. You'd think one of those Big Brains would have known how von Frisch earned his Nobel."

She was clearly enjoying the role-reversal of expert and novice. Her whole face seemed to glow, and Rayner found himself very attracted to her sparkling, dark eyes. They walked slowly along a pleasantly scented flower-lined path, among the unequally-spaced housing units—side by side, not quite touching. "Oh, you should have seen it," she continued. "Bees from hell to breakfast...the poor little critters would've probably tried for Outside too, if a wax spacesuit would work. Had to put the whole population to work, just like the original Maoists got rid of flies. Still lost over half of the hives in the first month, and a lot of people got stung. Sure a good thing that all residents had been screened for histamine allergy."

Her stride increased, nearly a skip, as she became engrossed in professional pride. "But gradually, with selective breeding, chemical scent trails, and—most importantly, of course—a distinct pattern of light polarization filters over each hive area, well, we were able to turn them loose again, much to the relief of those who had to pollinate the crops by hand. Oh, I'm sure that things would have gone a lot faster if you and your Dr. Tigue had been here. But I guess the higher-ups didn't know about your work then."

"I don't know about that, Diana. Sounds like your people managed very well in providing navigational cues in a world of multiple suns. I can hardly wait to start working with your bees." He was impressed, and also hopeful that he was correctly reading between her lines.

"We'll get to the bees first thing tomorrow. Right now, I know you must be suffering six kinds of dislocation fatigue. I bet you could use some solid food, too. That's your apartment, the one with the blue wall panels. I could have something sent over from the sector cafeteria; or if

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you like, we could head over to Selene Sammy's for a bunnyburger."

Rayner's bushy eyebrows drew together. "Bunnyburger?"

"Oh...we have chicken and fish, too. And if you're not a meat-eater, why there's almost every kind of vegetable and—"

"Nope, I'm a true omnivore...bunnyburger sounds very, ah, interesting."

The first week passed quickly, and Rayner was pleased at the way his survey parameters had been smoothly established. Like their leader, Diana's four-person crew had proven to be friendly and efficient. The petite Mai-Chen Yang had easily mastered his microsurgical techniques for extraction of the mushroom body from the workers' brains. And Freddy Cooke had become a real artist with the color-coding air-brush at the recruitment sample dishes. The visiting expert was still more than a little disconcerted every time he walked up the wall of the world to inspect a hive or sample dish on one of the upper garden levels. But now as he and Diana approached Hive 17, amidst a mixed plot of corn and clover, he felt well at ease with most other aspects of Habitat life.

"There goes a marked one," Diana said, as she pointed to a worker bee at the entrance to the black glass hive.

"Yeah. Ah, purple-white-green, that's the color-code for grid E-6, right? Turn on the IR, and we'll see if we can spot her dancing."

Diana switched on the internal infrared source—the end of the spectrum to which bees were blind—and two walls of the black cube became transparent. "Hey, great. There she is." Rayner pointed. "I'm really going to introduce these glass hives when I get back home; it's a wonderful idea. What with wood and plastic so much more plentiful on Earth, I never would have thought of it."

He noticed several unmarked workers doing a familiar round dance, which he readily interpreted as indication of a nectar source within ten meters of the hive. But as he watched the marked bee, he shook his head. "You'll have to read this for me, Diana. I'm still not used to that crazy zig-zag. It's certainly not the dance their Alpine Italian ancestors still do."

The Habitat apiculturist moved closer, and quietly watched the pattern for a few minutes—counting the number of jerks of the anal scent gland. "H'mm," she finally reported, "I'd say about 600 meters Counterrote, at about forty-five degrees with respect to that light panel. How's that match?"

Rayner pulled a small microfiche viewer from his breast pocket, and studied the magnified image of the sampling grid that he had laid out. "Bang on, lady. E-6. That puts it in the orange blossoms near Lake Heppenheimer. Any signs of abnormality that might mean metallic poisoning?"

"Well, she's a little slow, but I

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can't really be sure. Our zig-zag dance isn't nearly as accurate as the waggle dance that your terrestrial bees use for distance and direction. Her butt will have to go in the grinder before we can be sure, I guess."

"Yes, sorry about that, but at least we don't have to sacrifice thousands of your bees like the early surveyors had to. Let's go down to E-6 and mark a few more recruits, just in case we've got something here."

Several hours later, in Habitat "dusk" Derek and Diane—in the company of several of his new friends—sat around a table at Selene Sammy's, drinking beer and talking shop. Rayner took a foamy swallow from his mug, and sighed—Diana's Farmer colleagues were justifiably proud of their brew. "Think we've got enough to start collection and analysis tomorrow?" he asked.

"Fine by me, Derek. I've got six hives to harvest tomorrow, but I should have that honey out by 1100 if Paulo lends a hand." This from Freddy Cooke, whose thin, angular frame belied his delicate touch with the air-brush.

"OK with you, boss?" chubby Paulo asked from the end of the table. "You've got me booked for pollination check tomorrow."

"No problem, Paulo," Diana answered from behind her mug, "this business definitely has priority."

Freddy signalled for another round, and raised his voice to be heard over the din in Sammy's. "Never thought we'd fill the grids so fast. That time memory transfer sure spreads the recruits out in a nice pattern. What is that stuff, anyway?"

"Carol Tigue's got a paper on that, I'll see that you get a tape," Rayner answered. "It's a real jawbreaker, and Carol says that the molecular structure changes once a bee locks into a set gathering routine. When we inject that mushroom body substance from a trained bee into the hemolymph of naïve ones, why you can damn near set your watch by where and when the new bees show up at a testing site. Now, Carol isn't sure—"

Diana abruptly changed the subject. "Hey, what say we go someplace else for dinner? Sometimes it seems like all nine thousand of us are in here, and I know Derek isn't used to public smoking."

"Nine thousand one hundred and six," Freddy interjected solemnly. "Darlene Jacobson had twins this morning; I know 'cuz Barbara signed over her quota when we agreed not to have a kid."

"Well, whatever, I think—"

"Whoa, erase that, Diana," Rayner said. "I like this madhouse, and you know I smoke pot, so it's only the tobacco I'm not used to. I guess even that makes sense among you free spirits, since you keep all other pollutants and carcinogens out of Ley."

"Yeah," muttered Freddy, more than a little drunk. "Or at least we thought we did, but we may beeee damned yet." All concerned promptly showered Freddy with popcorn.

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It was well into Habitat evening by the time they all finished dinner. Several rounds of beer and the satisfying—and to Rayner, surprisingly tasteful—meal of fresh carp fillets, corn, and hydroponic rice had left them all in a mellow mood. As they left Sammy's, the others said their goodnights and the man from Earth was left alone with Diana in an off-duty setting for the first time in days. Rayner was more than a little puzzled. He had been receiving confusing signals from the woman for some time. Well, he thought, it's now or never.

"Uh, say Diana, I managed to get a bottle of fine Bordeaux past your customs people. Bet you've never tasted any."

An impish grin blossomed on the Habitat beekeeper's face. "Why Dr. Rayner, I thought you'd never ask. Lead on."

She linked her arm with his and they started walking toward his apartment. Pebbles of shale rattled as their feet moved along the rustic path and the night air held a hint of fruit and vine. Rayner was so startled by her apparent agreement to more than a nightcap that he was speechless until they arrived at his door. He fumbled in the pockets of his jumpsuit for a few seconds, then grinned.

"I keep forgetting, reaching for a keycard." Diana watched with amusement as he pressed the simple three-number unlocking code on the door. She squeezed his hand as they entered the small living room, and laughed.

"You should have left your paranoia Earthside, but I promise to protect you from the bears."

Rayner chuckled as well, and motioned her toward the Beta-cloth sofa. He assembled the wine and glasses, and joined her there. They toasted the lack of crime in the Habitat, and Diana pronounced her approval of the vintage. An uncomfortable lull developed in their conversation.

"Ah, your partner, Carol, she must be quite a woman," Diana finally said.

Derek was surprised at the question and the serious expression behind it. "No question. Carol Tigue's pretty special; we've been together since I founded Beeline. Couldn't run things without her."

Diana looked down at her drink and said softly: "I'm sure she is...according to your Bio, you've got a long-term contract, so—"

The psychobiologist straightened and set his wine down with a sharp clink, as glass met glass tabletop. He touched her chin gently—turning her face toward his. "Ohmygod, Diana, honey, so that's it. I've been trying to figure this out...I mean us...ever since we first met. Carol and I aren't lovers. Couldn't be if we were so inclined. Carol Tigue's a quadriplegic. She's been in a full exo-suit since she had a jet skiing accident in college."

Diana brightened, but her eyes appeared to mist. She dug through the sporran at her belt and retrieved a tissue. "Oh Derek, I'm so sorry, I had no—"

Rayner moved to put his right arm

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around her shoulders. "Hey, honey, don't feel sorry for Carol. She doesn't, and she's got more abilities than a dozen people without servo-assists. As for that contract, well it's for business. Much as I hate it, a lot of those crazy New Moralists down there just wouldn't hire somebody who wasn't 'married.' So, you see, there's nothing to—"

A wadded ball of tissue sailed in the general direction of the waste slot, and she snuggled closer. "Damnit, Derek, you must think I'm—" She shook herself, her chin came up, and she stared him straight in the eyes. "But listen, you great beebrain, if you call me 'honey' one more time, I swear you'll go on waiting to get laid on Ley!"

"Diana," he chuckled as he moved toward her inviting lips. "Your puns are terrible. And don't tell me you're sick of honey too."

By the end of Rayner's second week in the Habitat, the preliminary results did not bode well. With each batch of bees' abdomens, from which the tainted pollen made grist for a battery of instruments, the concentrations became more evident. Director Gould was alternately pleased, and impatient for the source to be pinpointed. On the one hand, the affected children were doing well; chelating agents were apparently slowly precipitating lead and mercury from their bodies. Unfortunately, both kids were too young and too sick to aid the detective work. On the other hand, Gould was now positive that rumors of a serious Habitat problem were circulating within the U.N., and he pressed the team for a definitive solution.

The unlikely possibility of cross-contamination from the Fabrication Sphere had now been clearly eliminated. All moon-ores were processed via solar furnace and electrolysis in that sphere south of the Hub, and even a space neophyte like Rayner had thought that air-locked isolation more than adequate. The pollutants, albeit at low levels, were definitely coming from inside the Habitat.

As he scanned yet another read-out on the chromatograph, Rayner rubbed his beard in frustration. "Mai-Chen, have you got another batch ready to go from any D or E grid? I think I'm beginning to see a gradient."

The elderly woman crinkled her face, adding several more eye-folds to the ones she had been born with. "No, sorry Derek," she said, as she glanced over a rack of sample vials. "D, E, and F should come in again tomorrow morning."

"Well, that's it here then. Got anything on your end, Diana?"

On the other side of the lab, Diana slowly turned her chair away from the atomic absorption spectrophotometer, and nodded. "Just could be. I think I see what you mean about grids D and E. Look at this."

Rayner moved beside her, lightly brushing her bare arm. He watched the results being printed on the instrument's screen. "Hot damn!" he

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said, "there it is again, but what weird proportions: lead, arsenic, nickel, mercury, copper, silver...but gold most of all. What the hell do you use gold for up here? You don't use coins—"

"You'd be surprised. At least I was when I checked with BESS," Diana answered with a smile. "Gold's used to color glass, to tint solar screens, and of course, we make a lot of microcircuits. But all that's done in the Fabrication Sphere, so—"

"Yeah, we've been there before...." The psychobiologist paused, his eyes glassy, then slapped his palm on the instrument console. "Hey, how about dentists?"

Both women were startled, and turned to him with puzzled expressions. "What do dentists have to do with gold?" Diana asked, while Mai-Chen chuckled.

"Ah, you're too young, child, and you didn't spend that many years Earthside," the Chinese woman said. "But I doubt if that's it, Derek. Even old crocks like me have their teeth in good shape here, and we only have two dentists. I'm sure that the few fillings that need be done on Ley are done with plastics. But it's a thought." Her hand moved to the keyboard at her elbow, and she addressed the computer: "T-164, Heavy Metals Survey. Check on use of metal gold in dentistry, current and past in Habitat. Correlate with current survey data. Execute."

Within seconds, the faintly feminine "voice" of BESS filled the room: "No recorded use of metal gold by dental personnel. Use of metal gold by medical personnel as follows: 6/20/2007, Neurosurgical implant; 3/12/2008, Neurosurgical implant. Full case files available only with A-1-A clearance. Correlation with T-164, Heavy Metals Survey is minus 0.16. Ready."

"Terminate." Mai-Chen sighed. "Well, nice try, Derek."

"Damnit, I feel like my head's being recycled along with everything else up here," Rayner replied with sinking enthusiasm.

Diana suggested that a break of a couple hours would be appropriate. Her expression left little room for doubt over her choice of morale booster. Rayner, still unaccustomed to the uninhibited openness of expression in the Habitat, blushed deeply when Mai-Chen winked at them.

By the next afternoon, however, the Vanzolini team had more than social reasons for celebration. The analysis of D, E, and F grids showed a clear pattern. Rayner stared at the lab wallscreen, where a red image in the shape of a nineteenth century keyhole was superimposed over the grid lines. "Diana, that's terrific. Now have BESS match that concentration gradient with the Habitat residential layout. H'mm, the way that pattern fans out, ah, that's the direction of the prevailing...ah, what the hell do you call atmospheric movement up here?"

Diana giggled. "We call it wind. We also have fire and water, but

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we're a little short on earth," she choked out. "And yep, Counterrote is the way she blows."

Rayner joined her in laughter. A couple of minutes went by while they grinned at each other, then he sobered. "Now for the final countdown. Ask BESS how many people live...and work in that area."

The answer was more sobering yet: 1426. In the silence that greeted that stark piece of data, Rayner became conscious of the mixed chemical odors in the monitoring lab.

"Ah, goatshit!" Diana finally said. "We'd better call Director Gould; we're going to need an A-1-A, and that takes Council approval."

He nodded his agreement, and instructed BESS to call Gould and display the same map on the Director's screen.

Gould quickly understood their request, but hesitated. "Look, Rayner, you've done a great job, but the Council's not going to let you go fishing in personal files. We value our privacy very highly."

"But that's what we need," Rayner explained. "We have to let BESS cross-correlate most everything—present occupation, previous experience, hobbies...."

"See your point, Rayner. I'll take it to the Council."

The Council, in its infinite committee wisdom, took two days. BESS, when provided with the proper access codes, took two minutes. The answer, once it appeared, was obvious—almost anticlimactic.

"Well, that explains a lot of things," Diana said as she tapped the screen with a short fingernail. "The pollution levels probably fluctuated widely—depending on what the bastard was doing. Those poor little kids were just at the wrong place at the wrong time, I guess."

BESS pointed to one man, a microcircuit fabricator who had been a jewelry designer on Earth. BESS said 0.92. Derek and Diana went along with the Director and two of his Environmental Officers—the closest things to cops in the Habitat—when they knocked on Glenn Baylink's door.

"Baylink, you bloody twit, what the hell are you doing in here? Where's the goddamned jewelry!" Gould shouted, as soon as the smaller man responded to the knock.

Baylink watched in confusion as the officers searched his house. Blinking through full-corneal contacts, the suspect stammered: "But what's the meaning of...how did you know about—"

The posturing little man fell quiet, as soon as the small solar furnace and brazing equipment were discovered. Gould examined the collection of chains, earrings, and knick-knacks that one of his men found in the back of the house. "Pity," Gould said as the jewelry jingled softly in his hands, "this stuff's good. Too bad you weren't as much of a metallurgist as you were an artist. This it, or have you been selling stuff too?"

The goldsmith calmed somewhat,

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and shook his balding head. "No, no, Director, I...well, I gave some things to a few lady friends, but I wouldn't sell...and look, I'll pay for the gold. I mean, I know I wasn't authorized to siphon off any...but, I really didn't do anything so wrong."

"Wrong!" Gould continued to shout. "You moron, you've been poisoning the whole Habitat. I suppose you think there's free, metallic gold on the moon! Damnit man, those telluride ores that we process add dozens of contaminants to the gold that first comes out of the soup. You've been spreading that crap over a kilometer of people, and crops, hell, even a lake! And you'd better pray that the medicos have stabilized the condition of a couple of kids in the clinic."

Baylink seemed to wilt. "Oh, but I couldn't...I used plenty of fiber glass filters—"

"Get the bloody fool out of here, men," Gould said, his face mottled and red. "The Council would like a word with him."

That night, the celebration was boisterous at Sammy's. Word quickly spread about the true nature of Rayner's research and the result—a secret within Vanzolini's group until then. Rayner finished his third free beer, and sighed. "I must say, this is one job I'm well pleased with. Can't say I don't appreciate Director Gould's generous offer to stay on an extra week, either. I can't think of a finer place for a long overdue vacation."

Diana smiled her agreement.

Rayner paused for another swallow, then continued. "Funny, I'd have thought that in a community as small as this, word would have gotten around when Baylink started handing out trinkets to his girl friends."

Mai-Chen Yang winked a wise old eye at him. "Ah, c'mon, Derek. Baylink was no prize. How do you think those ladies earned their jewelry? Bet those women had long-term contracts with other men too."

The Beeline president nodded and traced a thoughtful finger through the ring of condensation on the fiber glass tabletop. "Yeah, I guess so, but I sorta feel sorry for the little jerk," he said. "What'll happen to him anyway? They dock his credits, or what?"

Freddy Cooke leaned over his mug. "There's no precedent, but I wouldn't be surprised if the Council throws him out...the environment does come first."

Rayner almost spilled his fresh beer. "Out! You don't mean—"

"Outside? Not to worry, Derek. He'll just be exiled to Earth," Freddy said and grinned.

Rayner let his eyes rove over the relaxed, happy faces, then his gaze moved upward. Like many buildings in the Habitat, Sammy's was open to the "sky" and the panorama was always impressive. "Yeah, well after being here awhile, I can see how that punishment would fit the crime. Yes indeed, Lucifer's fall...or at the very least, Adam's."■

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DOWNEAST

encounter

This just may sound a trifle familiar . . . .

THOMAS A. EASTON

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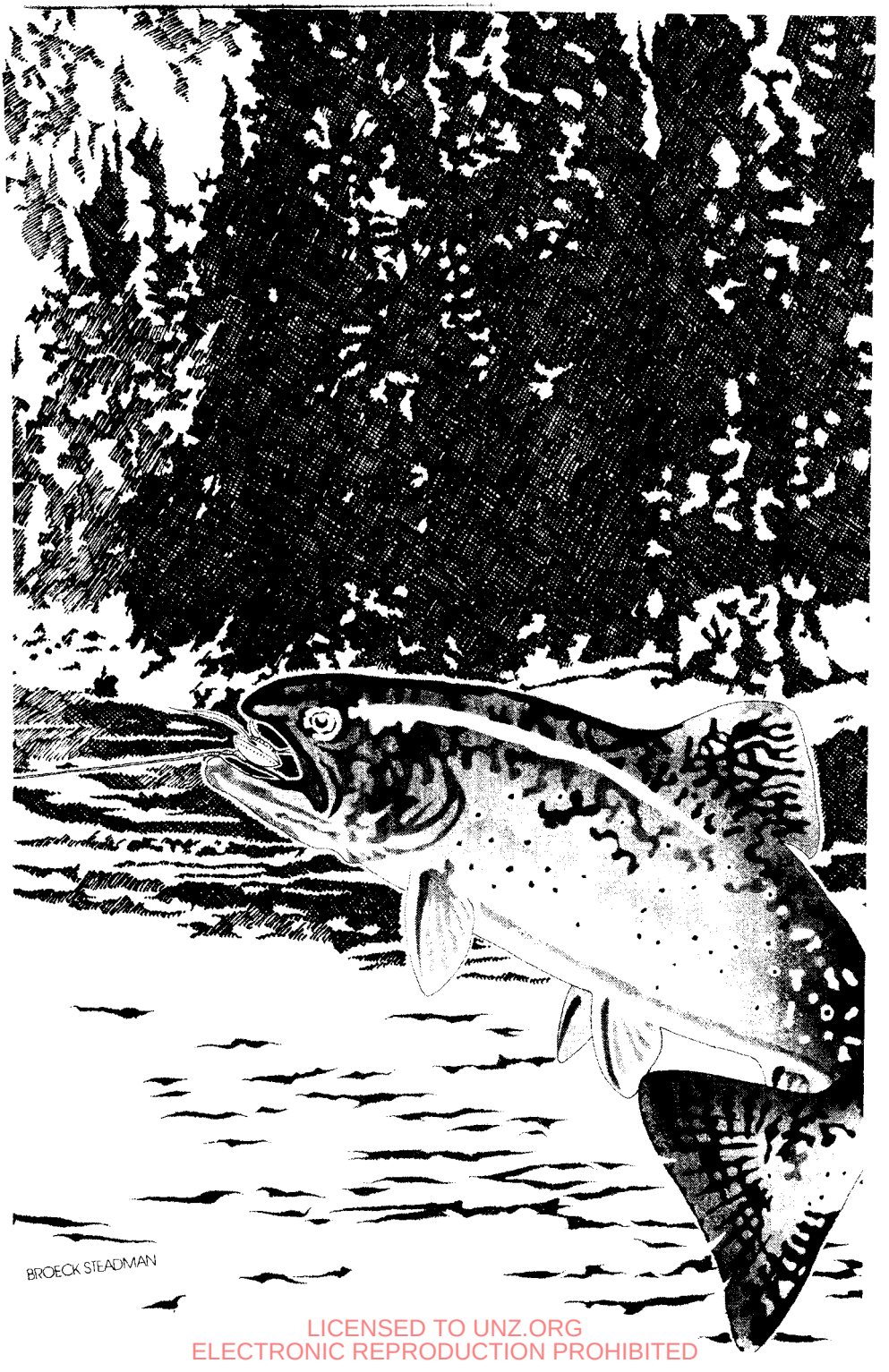

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The tiny flying saucer whipped past overhead. It was surely, thought Howie Wyman, the dodgamnedest trout fly ever made. It was a sliver of wood painted silver, with a row of black squares around the rim and three streaks of red artistically placed to suggest a spinning motion. It was mated to a fishhook and adorned with a hackle and three fibers from a pheasant tail feather. Just what the folks downriver had sworn they saw last summer. The same folks who swore they caught trout on churchkeys, pop-top tabs, and old cigarette butts. Hah! He'd show them, he would.

He spat a stream of tobacco juice onto the bank and pumped the rod again, letting out another fifteen feet of fly line. His weathered face was intent on the task. Of average height, he'd once been told by his Aunt Babe that there was Indian blood in the family. He looked it. He had high cheekbones, and his hair had once been jet black, though now it was well salted with white. His fingers, so long and deft as they handled the loops of line, were gnarled. The joints swelled like the pellets in a rabbit's gut. They pained him from time to time—though not now, not in spring, not when fishing—but he took that as natural enough. He'd worked hard all his life, and outdoors at that, in the cold and wet. He was a blueberry picker. In season, that is. The rest of the year, he might do a little clamming, up to his knees in tide-flat muck. He might work in the woods a bit or help out with a neighbor's haying. He might even poach a deer or two. But all these activities were secondary. They merely kept his body and soul together, and his wife from leaving him, while he devoted all the time he could to his true love—trout fishing. Not just any trout, either. He might accept a brownie or a rainbow if it chose to commit suicide in his creel, but he wet his line only in waters he thought might hold a brookie or two.

Like here. A wide, deep pool, shaded by a wall of ledge and its crown of greening birch, fed by a spring-fast stream. Foam around the rocks at his feet. A cool, moist breeze. A glimpse of mink or deer. And every year, the trout. The speckled, leaping brook trout. The biggest he'd ever taken here had been two and a half pounds.

Spring and a trout stream! Howie was no poet, but he came close at moments like these. The great tragedy of his life was winter. Not only was the trout season closed then, thanks to the busybodies up to Augusta, but the streams were all iced in. He couldn't even poach. He had to console himself with his flies, turning feathers and hair and bits of tinsel into barbed impressions of minnows and bugs. Even of flying saucers, he chuckled as he let his line float down onto the water's surface. The saucer touched with a gentle plop and sat there, rocking.

Emma hadn't thought much of it. "You are crazy!" she had screamed when he had produced the saucer.

"Now, now." He had waved the new fly placatingly. That had been a mistake. His wife, a tiny, forceful

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blonde, had needed no reminding of how her husband wasted his time. Shrilly, she had screamed again. "You're crazy! That thing won't catch fish!"

"Of course it won't. That's the whole..."

She hadn't let him finish. "The car needs a new transmission! We need wood! We need clothes! Look at you!" She had pointed scornfully at his frayed denims and her own faded Sears skirt. "We need food! And you! You're busy trying to prove some *thing* to those bums you hang around with all the time!"

He had shouted her down. "It's not pointless! They say a trout'll bite on anything. I'm gonna prove it won't."

"A saucer fly!" She had laughed. "Hah! Give it to your sister's kid Petie. He'd have some fun with it. Maybe it'd help him learn to cast. Why you can't use worms and get more fish..."

"I get my limit," he had interrupted hastily. He did, too. He was good, and he knew where the fish were.

"And that's damn few fish these days. Why don't you catch bass and perch and bullheads, too?"

He had shuddered. Trash fish? They might nourish his belly, but his spirit would starve. He'd have to be awful hard up, he knew, and even then his heart wouldn't be in it.

He twitched his rod tip, lifting the line and the saucer from the water. He drew back his arm, letting line and fly whip overhead into his backcast. Forward again, and back, while the hackle dried, and forward once more, to land in the lee of a boulder. He had taken trout right there before, and if a flying saucer could seem like trout food, that was the spot. But nothing happened. He flicked the line to make the saucer bob. Still nothing. Just as he had thought. They *won't* take just anything. He picked another spot, where the water flowed under the wall of ledge. He cast again, telling himself he really ought to put on a real fly and catch some dinner.

But just as his tiny saucer was settling to its landing, the water exploded beneath it. Damn! he thought. The line tautened. His reel protested as the tension overcame the drag. His rod bowed, and the fish leaped clear of the water, striving mightily to shake free the hook. It was a big one! Five pounds, if it was an ounce! The biggest he'd ever had on his line!

Twenty minutes later, he eased his net under the exhausted fish and lifted it from the water. The saucer hung from its lip like a vagrant's cigarette. The gills fluttered. The spots gleamed red and blue and gold in the sun. It was a thick-bodied spring feast for Howie and Emma. It was surely the biggest, the brightest, the best of all the trout in Maine, even if it did prove Howie wrong about his saucer.

"Please, would you take the hook out of my jaw?"

That was how it all began, early one Saturday morning. A talking trout, and a flabbergasted fisherman. I was around the bend, fishing another

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pool, when I heard the flabbering start. Since I hadn't been having much luck, and I was about to move on anyway, I didn't hesitate. I reeled in my worm, caught the hook on the bail of my reel, and headed upstream.

It sounded interesting. A vaguely familiar male voice going "Bu-bu-bu-bu..." at the top of its lungs. I wondered what he'd caught, but I didn't waste time trying to guess. I needed all my attention for the rocks I was stumbling over and, besides, I'd be there soon.

In another moment, there was only a moderately large boulder between me and where the voice had come from. I rounded it and stopped. A man was squatting beside the water. His beat-up fly rod lay on a rock nearby. He was dressed in faded denim overalls, a blue work shirt, and ankle boots. The back of his neck was dark and seamed, like his boot leather. The hair that escaped the band of his crumpled green felt hat was shaggy and grey.

Even from this view, I recognized Howie, and now the flabbering struck me as a peculiar thing to hear. He had the reputation in town of being as laconic as a proverb. I stepped closer, until I saw his net and its burden. I whistled. "That's a nice one, Howie."

He looked up, startled. "Morning, Mayor. 'Tis, ain't it?"

In our small town, I had the smallest, most unpaid job. I could afford it, since I was also the local oil dealer, and it meant everyone knew me. They even, to some extent looked to me for leadership. "Ayuh. You sounded pretty surprised when you netted it."

Howie sat back on his heels. He pursed his lips, and a gob of used tobacco hit the stream. "Well, I'll tell you. As soon as I got him beached, he suggested I take the hook out of his mouth." He reached to one side, searched with his fingers for a second, and held up his fly. "This one." His eyes never left mine.

I looked. I grinned. "You sure you're not turning into one of those UFO nuts, Howie? That fly, and a talking trout?" I shook my head, still grinning. And this was the town's odd-job man. I'd have been less surprised to find Lydia Seltzer involved in a thing like this. She was the high school science teacher, and she'd nearly been fired over the wendigo business. "Ought to get you on Johnny Carson, anyway."

"He's not lying, mister." I started. The fish! Tangled in the net, on its side in a puddle between two rocks, it had squirmed itself around to face me. Its jaws were half open, its flanks heaving with effort. "Though he never would have seen me if he hadn't waved that damned *spruleer* over my nose!"

I dumped my first thought right away. Howie, a ventriloquist? And spruleer? Was that what a talking fish called a flying saucer? It *could* talk, by damn! This was something new, something I'd never thought to see. Or was I dreaming? Maybe I'd fallen and knocked myself out on a rock. My fingers trembled as I pulled my tobacco pouch out of my hip pocket and

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began to load my pipe. "What were you planning to do with it, Howie?"

"What the hell can you do with a fish, Mayor?" He stared at the trout, fingering his fly. He shrugged. "Even a talking one. Thought me and Emma'd have it for supper."

"But . . ."

"Now wait a minute! I didn't come all this way to . . ."

"What d'ya mean?" put in Howie. "You musta hatched within a mile of here."

"I wasn't hatched!"

"So where did you come from?" I asked. "Out of a cocoon?"

The trout snapped its mouth shut as it squirmed to bring its left eye to bear on me. I might have been a bug, or another spruleer. "Close! I crashed, a year ago, and the bioformer kicked me out like this. There wasn't enough power to give me a more useful body, like a human or a bear."

"You crashed? In what? A flying saucer?"

"You got it. I was a spruleer pilot." There wasn't really anything you could call an expression on the thing's face. A fish just doesn't have the muscles. But its voice did show some kind of feeling. Pride, now, maybe. But it was hard to believe, and I couldn't resist the urge to heckle. This trout was talkative enough, but I wanted to learn all I could before I woke up. Or whatever. "In a body like that?" I said. "No hands, no . . ."

"I told you I was bioformed! It's regulations on an inhabited world. No one leaves the ship in an incompatible shape. The computer sees to it."

"And the ship? Where's the wreck?"

"Regulations. Automatic destruct."

"You've got so many answers, it's hard to believe you. In fact, I'm not sure I do." I finally got my pipe lit. I gave it a couple of puffs to get it drawing well, and then I blew a cloud of smoke at the fish. He didn't like it. He flopped, splashing water with his tail. "Any trouble, and you're marooned, just like that. And no way to holler for help. Or is there a way?"

Well, that did it. There's nothing like skepticism to get you told, and told good. There was a way, all right, but it hadn't been working. It hinged, he told us, on the one device that never went up with the ship. Every officer had one implanted in his brain. It was a contiguity manipulator. The universe was a sheaf of world-lines—of parallel worlds, to us—and with his gimmick our trout could replace any object in this world with its counterpart in another. Since in an infinite sheaf anything must exist at every point, he could in principle have anything he wanted. He could switch a boulder for a Cadillac or a cave for a mansion. But that was only in principle. In fact, he was limited by probability and energy. The most probable counterparts, the ones found in the greatest number of world-lines in some form or other, were those nearest in the sheaf to our own line. And going beyond those world-lines took more energy than his small body could supply the manipulator.

As for getting him rescued, every

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time he pulled a switch, he generated an improbability wave that could be detected by offworld monitors. If the disturbance was great enough, if the switch was between world-lines far enough apart in the sheaf or if it meant a large enough disruption of local probabilities, they would come and check. The trouble was, there wasn't much a trout could do in his stream to make waves. He could turn pebbles into caddis flies and twigs into minnows. It kept him well fed—he had gained three pounds in the last year—but that was about it. The really significant, wave-making alternate realities just weren't within his reach. He was frustrated, naturally, and that's why he'd struck at Howie's fly.

He demonstrated his talent by switching Howie's rod for an almost new split-bamboo rig. I didn't understand, but the rod was a beaut and it set me thinking. I was the mayor, wasn't I? I had responsibilities, didn't I? "Howie," I said. "Have you got a bucket in your car?"

"Ayuh," he answered. "But it leaks."

That wouldn't do. I looked around the rocky bank of the stream until I spotted an abandoned beer can. I retrieved it and set it down by the trout. "Can you switch that for a bucket?"

"Sure." And it was done. I had a yellow plastic pail just like the one my ex-wife once used to wash her sweaters. I filled it from the stream, and then I dumped the trout out of Howie's net into the bucket. He hit with a splash and swirled to poke his nose out of the water. "What do you have in mind?" he asked me.

"Well," I said. "As long as you're here, you're stuck. Right? You can't change anything important enough to get yourself noticed and rescued. But we can take you someplace else, where you can shake things up a bit. Give you a chance to get home." I blew another puff of smoke in the fish's general direction and looked at Howie. I could see his thought: "There goes my dinner." I said, "Proof of the pudding, eh?"

As Howie nodded, the fish swirled again. Alien or no, he acted like a trout. His swirls were so much like the ones a real trout would make picking off nymphs that I was tempted to try a worm on him. But then his nose came up, and he said, "I was warned about this. You want me to make you rich." He sounded suspicious.

I shook my head. "Not a bit of it. It's just that I could use a little help with my job."

"Uh-huh. Just so you get me home." He didn't sound like he believed me.

"By the way, though, what should we call you?"

He cocked an eye at me, then at Howie. "What's the difference? You need a tag to remember a talking trout?"

"Then you're Oscar." Howie surprised me. Oscar? He must have noticed my expression, though, for he then turned to me and added, "Had a goldfish named that once."

"Fine," I said. "Let's get back to the

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cars. I'll meet you at the high school."

The town didn't have much money. Neither did the county nor, for that matter, the whole state. We'd been enjoying our own private recession for over two hundred years now, and the place showed it. Most of the roads had more cracks and potholes than pavement. The town hall needed a coat of paint, new wiring, a new roof, and God knew what else. The fire department needed new trucks; hell, it needed working trucks. The jail needed rebuilding. And the schools—well, federal money had given us a new elementary school just a few years ago, but the high school was another matter. The roof leaked. The furnace didn't work. The windows were broken. There wasn't any gym, and the athletic field was a mudflat.

When we pulled into the dusty parking lot, I waited for Howie to walk up beside my car. Then I hauled the bucket off the front seat and set it down in the dirt. "All right, Oscar," I said. "Can you see this mess? Can you switch it for a better model?"

He poked his nose out of the water and said, "Not from here, I can't. You'll have to carry me around and show me what you want replaced."

"Give us a paved parking lot."

And he did. One moment we were ankle deep in dirt. The next we were standing on nice smooth blacktop. "That was easy," said the fish. "It should give the monitors a blip, too."

Easy, he said. And I didn't have the vaguest idea of how he managed it. A fishing rod was one thing. So was a bucket. But this! A 200 by 30 strip of tar, materialized out of nothing. I consoled myself with the thought that I didn't have to understand it to take advantage of it, and we got on with the job.

I showed Oscar the playing field, the rickety bleachers, the leaky roof, the broken windows, the dead furnace, and all the rest. And as fast as he saw the problem, it was gone. In an hour, we had a brand new high school, and it hadn't cost the town a cent. Though that wouldn't stop the hooraw come Monday morning.

I gave Howie the bucket then, and we visited the jail, the fire department, and the town hall. I got the people out of the way, gave them a little pep talk about how things were going to improve real soon now, while Oscar did his stuff, and then we ducked. I didn't want to be around when they noticed the changes.

With the town taken care of, Howie and I headed over to his place. We dropped his car there, Howie jumped into mine, and we sat there. What now? There had to be something else we could do with our pet miracle-worker, but what? I was gripping the wheel with both hands, staring thoughtfully out of the windshield, when Howie nudged me. "Say, Mayor. You've fixed up the town, but what about us? Look at my house."

I looked. It was a small frame, painted white a long time ago. The roof sagged, the windows were still covered with their winter coat of plastic, and the yard was littered with

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discarded junk. I thought I recognized an armchair my wife had consigned to the dump two summers ago. Without a word I lifted the bucket to my lap, let the trout get a good look too, and Howie had a trim brick ranch with a two-car garage and a slate walk. He shook his head. "What will Emma say?" He shook his head again. I could just imagine his thoughts. But he surprised me again. He said, "And you?"

I started to say that I had enough already. I'd just been doing my job, after all. But then I stopped. I was an oil dealer, wasn't I? And I had three empty 50,000-gallon tanks, didn't I? Thanks to the allotments they laid on in '87. I stepped on the gas, and we headed for my lot outside town. On the way, I had another thought. How about the roads? Could Oscar do anything about them? I told Howie to hold the bucket up, and the potholes started filling in fifty feet in front of the car. It was the smoothest ride I'd had in years.

Once my tanks were full, we just drove, fixing up the pavement as we traveled. We hit the town's main street, twisted in and out through the residential sections, and smoothed out the three county roads that linked us up with the rest of the state. We even paved a few roads that had been dirt as long as I could remember.

It didn't take long. Three hours later, we were parking in my driveway. And we hadn't attracted any attention to speak of, even though we had met some traffic. Think about it: you're tooling along a rough road when the pavement suddenly turns smooth. Do you notice the car coming your way at just that moment, much less blame the change on it? Do you realize the new paving is approaching you a bit faster than it should? Of course not. You're too busy being grateful the sons-of-guns have finally gotten around to fixing things up.

Anyway, we were done. And if our alien trout's monitors couldn't get a fix on him from all the blips we'd made, I'd get him an upholstered aquarium with a waterproof TV. "C'mon, Howie," I said. "Let's have a drink."

He was agreeable, and as soon as I'd filled the sink with water—I have a well, so it's not treated—and given Oscar a little fin room, I got out the jug and the sandwich fixings. We settled down right there beside the sink and ate. And drank. Along the way, we found out the trout liked bologna, especially if one of us had dipped it first in his whiskey glass. That started us laughing until we both swore we'd have to try the combination out as bait. And that led Howie into telling me how he'd come to make his saucer fly.

"But you know," I said. "A trout will bite on anything."

"Horseshit," said Howie. "I know better."

"Sure. Anyway, anything that flashes just right in the water, so it looks like a minnow. Or anything that sits just right on top of the water. You take a look at one of those flies of yours sometime. They don't really look much like bugs, do they? It's the

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hackle. It makes dimples in the water, like legs. That's what they see. That's what they strike at."

"So how come some flies don't work?"

I shrugged. "There are folks who swear by any fly you can name." We had another drink, and Howie sloshed a bit of the bourbon into the sink. Oscar seemed to like that. He splashed his tail and heaved his gills a couple of times. And then he stuck his head up to tell us. "Nuts," he said. "Half the time it's just that we get pissed at all that crap being dragged over our heads. If we had sense enough to keep our mouths shut, you'd never catch one of us."

"Us?" said Howie.

I swear that trout seemed to snarl. His gills flared and his jaw twisted, and he muttered something about having been stuck in this body too long. He was identifying with it, and if he didn't get rescued pretty damn quick, he'd go native all the way.

I stuck my oar in by asking how long it should take. "We made enough waves, didn't we? They know you're here by now."

"Oh, they know. They're probably frantic, the things you had me doing. But they've got to zero in, and for that they'll need a few more blips."

"So keep the jug full." And it was full. "But why should they be frantic?" And then I got it. Sometimes I catch on fast. Sometimes I don't, like now. But if I had, the town would still be a shabby mess and Oscar would still be a castaway. "Hey, Howie," I said. "Where do you suppose all that stuff came from?"

"How should I know?" he said. He took a swig of whiskey and shrugged. "He waves a fin, and I've got a new house, or a new rod. Looked like magic the first time he did it. Still does."

Bless him! Magic! But Oscar had said something about parallel worlds. Worlds full of people just like us, people who had worked their butts off to get things we'd gone and swiped out from under them. I felt low, and I said as much. "Howie, we're no better than crooks. We stole all that stuff, and we should give it back before we're caught."

"Mayor, Mayor," said Howie. "That's gotta be the booze talking. Who's gonna catch us?"

There was a swirl in the sink. "The monitors," said Oscar. "They rescue me, ask me what I switched to make all those blips, and put everything back where it was."

"Oh, yeah," said Howie. "I like that rod." And he grabbed the jug and poured about half of it into the sink. There was a flurry of splashing as Oscar soaked the alcohol up through his gills, and then nothing but quiet. I stood to peer into the water. I wasn't any too steady on my feet, but I could make out Oscar laying on the bottom, on his side. His gills were moving slowly.

"He's out cold," I said.

"Serve him right," said Howie. "Maybe he'll wake up like me after a three-day bender."

"How's that?"

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"He'll be a blank on the last week. We'll keep it all. Have another drink."

I did. So did he.

In the morning, I had a head like a sack of wet concrete. I was so thick and fuzzy that it took me half an hour to realize I wasn't in my comfortable bed, but slumped on a kitchen stool. The blur a few feet away was Howie Wyman. I kicked him, but not hard. I couldn't have dented a pillow. When he opened his eyes, I asked him, "What you doin' here?"

"We was drinking," he got out after a minute. "Coffee?"

I stumbled to my feet and found the pot. I went to the sink to fill it, did so, and set it on the range. Then I turned back to the sink. There was something about it. It was empty! My head cleared a bit. "Oscar's gone," I said.

"Oscar?" mumbled Howie. "Oh, yeah. Gone?" He got up to look, and we both headed for the living room window. The road was still smooth. We looked at each other. I pointed. "The telephone's back in the kitchen."

I got out the instant while Howie dialed his number. Emma answered. I could hear her across the room, a buzzing scream that made me pity Howie's ears. "What did you do with our house? Where have you been all night? The house!"

Howie's grin was no more relieved than my own. I reached for the bottle—it was still full, even though I knew we had kept on drinking after Oscar passed out—and poured a dollop in both our cups while he said, "Fisherman's luck, honey. I got us a new one."

He hung up, the pot whistled, and I poured our cups full. When I handed him his, he raised it as if in a toast. We drank, and our heads began to clear. At least, mine did.

That was when I saw the note. It was stuck to the refrigerator door with one of those little magnets everyone has. I didn't remember putting anything there myself, so I crossed the room to look at it. It was printed in pencil, laboriously, as if the writer weren't really at home with the method or the language. It said:

I have a headache, but thanks for everything anyway. Don't worry about losing the improvements. The monitors were able to compensate by drawing on one of the dead lines.

So we got to keep the goodies. I knew that already, from the window and the phone, but it was nice to know the aliens didn't balk at handing out rewards. Or should I call it a salvage fee? That trout body was equipment of a sort, wasn't it? But the note went on, and in a vein that made me laugh. I handed it to Howie and said, "It looks like one of us is going to have to get a guide's license."

He drained his cup and said, "Got one. Not much call for guides anymore, though."

But there will be. The note's last words were:

It'll be good to see home again, but I will be back. I never did get to go fishing—Oscar. ■

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The Old Gods Waken, Manly Wade Wellman, Doubleday, 186 pp., $7.95.
The Door into Fire, Diane Duane, Dell, 304 pp., $1.95.
Sundiver, David Brin, Bantam, 352 pp., $1.95.
The Douglas Convolution, Edward Llewellyn, DAW, 190 pp., $1.75.
The Bright Companion, Edward Llewellyn, DAW, 176 pp., $1.75.
The Sheriff of Purgatory, Jim Morris, Doubleday, 218 pp., $8.95.
Binary Star #4, "Legacy," Joan D. Vinge, "The Janus Equation," Steven G. Spruill, Dell, 287 pp., $1.95.
Starry Messenger: The Best of *Galileo,* Charles C. Ryan, ed., St. Martin's, 198 pp., $9.95.
Alien Worlds, Paul Collins, ed., Void, 252 pp., $12.95.
Barlowe's Guide to Extraterrestrials, Wayne Douglas Barlowe and Ian Summers, Workman, 146 pp., $7.95.
The Death of the Sun, John Gribbin, Delacorte Press/Eleanor Friede, 178 pp., no price given.
Beyond the Four Dimensions, Karl Brunstein, Walker, 222 pp., $12.50.

BY TOM EASTON

How much place does fantasy have in Analog's book review column? As much, perhaps, as the book reviewer chooses to give it. Although this magazine publishes very little fantasy, I am sure most Analog readers do enjoy some variation in their literary diet. And the books that come my way do include enough fantasy that it is easy to pick a few examples worth reviewing. One such is Manly Wade Wellman's **The Old Gods Waken.** Wellman is well known as a producer of beautifully crafted tales of occult horror set in the Appalachians; most are published in *F&SF,* and the collection *Who Fears the Devil?* (Arkham House, 1963; Ballantine, 1964) is now being reissued by Dell. *Old Gods* is the story of what happens when two Englishmen take over an Appalachian mountaintop with an eye to reviving Druidism and are confronted by John, Wellman's minstrel hero, a woman anthropologist specializing in magic, and an Indian medicine man with a college education. The premises are occult, but the outcome depends strongly on Wellman's rational approach to his subject. To him, magic is a kind of science, and his fiction would not fit too badly in this magazine. It certainly would have fitted the old *Unknown.*

Another fantasy is Diane Duane's **The Door into Fire,** which enjoys an extravagant introduction by her companion/mate/spouse David Gerrold. The book is worth the extravagance. The story of a young man who seeks a

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way to control and use the power of the Flame within him, it incorporates the most normal-seeming, rational vision of homosexuality I have ever seen. In Duane's world, it is entirely natural for a person to love without regard to gender; the sole related moral imperative is to reproduce before choosing a permanent lover. Given the temper of our times, this inevitably distracts the reader from the story at least a little, but it also does a great deal to make the story alive. In Herewiss' search for his Flame, he aids his (male) lover Freelorn in his struggle to regain a kingdom. Herewiss' motivation is at once political, religious, and romantic, and the more powerful for the blend, and the conflicts with his own quest are the more painful. Read, reader, and enjoy a new talent of promising skill.

David Brin is another writer to watch. He's new to my knowledge, for I haven't seen anything by him before, but his **Sundiver** is so good that it might have been written by a veteran (not that I believe you can always depend on the veterans!). It's an intriguing, absorbing, provocative book whose flaws are minor, and I look forward to his next. The premise is that once we achieve star travel and encounter alien civilizations, we find that each intelligent species has achieved its intelligence with the aid of a predecessor, and the multispecies galactic civilization is based on this system of "Uplift." Each species spends an eon or two indentured to its Uplifter patron. Humanity, however, seems to have no patron; it is unique in that it evolved on its own, and this leads to a conflict between two factions that might be labeled "Human Pride" and the "von Dänikenites." The Human Pride folks insist on trying to maintain some self-sufficiency, on continuing scientific research despite the seeming omniscience of the Galactics' Library, while the von Dänikenites strive to learn what species humanity's patron *must* have been. Fortunately for Human Pride, human researchers have found what seems to be intelligent life on the sun, a unique discovery that sparks much of the plot and counterplot that motivates the novel.

The story's background offers a good example of novelistic integrity. It includes furniture reminiscent of Clarke's and Sheffield's orbital elevators—"Needles," twenty-mile-high, hollow, pressurized towers, up and down which spaceships are carried by balloon, and whose place in the hero's background provides a driving neurosis. There are the human Uplift efforts, mutating dolphins and chimps to intelligence. There is political history leading to a separation of humanity into citizens and "Probationers," violence-prone individuals banned from space and alien contact. And it all fits together to make the story a strongly woven, believable whole.

The story's greatest flaw is that the roles of the characters struck me as insufficiently defined. The hero, Jacob Demwa, of the powerful Alvarez clan, is supposed to be a variety of detective, skilled at ferreting out plots. But his function takes a curiously long time to become clear, given that the story is structured as a detective novel, even to a "parlor scene." The same is true for the various villians and red herrings, but this flaw would matter

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more in a true, non-SF mystery. Here the reader is not prepared for the conventions of mysteries, so he or she should be bothered less by their lack, though some aggravation is inevitable as the pattern emerges. Nevertheless, the book is worth reading, and I strongly recommend it.

Still another promising new SF writer is Edward Llewellyn, an accomplished researcher in engineering and medicine. He has already produced two novels, both set in a future history with plenty of room for more. First published was **The Douglas Convolution**, in which a 1980 mathematician uses his discovery of a means of time travel (the convolution) to leap ahead to 2170, where he assumes the persona of a soldier, Captain Gart. His new world is the product of a twenty-first century depopulation resulting from the widespread use of a drug that sterilized female offspring. Fertile women survived only in a few scattered enclaves, one of which became the Order, apparent rulers of the new world. The most visible function of the Order is to supply highly skilled, female copter pilots to the soldiers of the Guard, based on Malta. Gart and his pilot take on the task of fighting back a barbarian resurgence. Thanks to Gart's antique military skills, the fight is remarkably successful, and thanks to his archaic attitudes, his pilot is soon "corrupted" into loving him.

But enough. The story is readable and well told, though less so than **The Bright Companion**, in which experience shows. This book is set in the first generation after the sterilization, when world population is still declining and civilization is at a nadir of anarchy. David, the pill-peddling son of a doctor who died before he could teach his boy much medicine, travels up and down the Shenandoah valley. He is joined by Ann, a woman traded for peace to local farmers by an enclave of fertility, and together they make their way to the Chesapeake, across the Atlantic, through the Mediterranean, and to the embryo of the future Order. The book is a travelog, livened by a love-hate affair between a weak David and a domineering Ann and by scenes and characters memorable enough to give Llewellyn's future a sense of reality. If it could really be, it might well be like this. My main objection is that I don't believe it could happen—no drug would be taken quite so universally as his premise requires.

Jim Morris' first SF novel (he is also the author of *Strawberry Soldier* and *War Story*) is very promising. **The Sheriff of Purgatory** is entertainingly readable, not least for its warm depiction of a hard-nosed lawman mellowed by meditation and yoga and his witchy woman. Sheriff Frank Spurlock is the law for Purgatory, a small Arkansas town and county surrounded by the anarchy that is all that remains of the U.S. after losing a war to the Russians and Arabs ten years before, in the mid-1980s. The strongest "government" left is that of the Mafia, for Washington is impotent and the country is assailed by the disillusioned guerilla remnants of the armed forces. A Mafia representative, Senigliero, comes to Purgatory with a "let us in or else" offer and is rebuffed. Spurlock then leaves town to try and save his ex-wife and children from the cesspit New York

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has become (why do you think I live in Maine and Spider in Nova Scotia?). His journey becomes a revealing travelog as he quests, fights off Mafia assassins, finds his family, and meets Senigliero again. Unlike many post-holocaust novels, however, Morris' tale is not an exercise in pessimism, for he shows hints of a way up from the slough of despond that is the main effect of defeat, and he does it with abundant, appealing humor. And unlike all too many SF travelogs, the journey is well integrated with motivation and plot. *Sheriff* is a very satisfying read.

Now, I've noticed as I put this column together that I'm saying a lot of fairly nice things—and I'm not done, either. Yet, in past columns, I've occasionally been pretty caustic. And I haven't mellowed. The thing is, when I was new to reviewing I wasn't getting so many review copies and I couldn't be quite as selective as I—or you—might have wished. Now, though, I'm up to here in review copies and I find myself telling you mostly about the books I got off on. That's fine, too, since you want your reviewer to tell you the good buys, but don't get the wrong idea. I can still cut the new clothes off the Emperor, and I will whenever I find a book that cries out for a warnoff or invites an attack of joyous sadism.

That last paragraph is by way of prelude to, not a retraction, but a withdrawal of bias. I had some unkind words to say when I reviewed *Binary Star #2* last September, and with them I expressed a certain skepticism about the quality of *Binary Stars*, period. I am happy to be able to say now that one can be a reader's treat. **Binary Star *#4*** convinced me, for it contains Joan Vinge's expansion of her Analog story "Media Man" as "Legacy" and Steven Spruill's "The Janus Equation." "Legacy" is more satisfying than one might expect; "Media Man" left off with hero and heroine at loggerheads over her belief that he had tried to kill her when, in truth, what he did was the only way he could see to save her. "Legacy" adds a long section in which the two are brought together again as co-operators of a ship; they are to use it to prospect among the ruins of Heaven Belt's shattered civilization and to buy the ship out of their profits, if any. Basically and simply, it rounds out the story by completing the "boy meets girl" plot recipe. At the same time, it shows us more of Heaven Belt and displays the insight into human social structures which a background in anthropology can give a writer. The insights into human character are Vinge's own, and here perhaps she is weaker. The hero, for all his supernatural competence at prospecting, is so pitiably self-involved a schmuck that he is hard to believe in.

Spruill's "Janus Equation" is a tale of a corporate world in which a brilliant, young mathematician seeks the equation that will make time travel possible. He is threatened by rival corporations, offered bribes, and kidnapped. That he survives is due less to his corporation's zealous security men than to the intervention of a mysterious stranger whose identity is so intimately involved in the story's end that I dasn't reveal it. I can, however, say that Spruill's

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characters are believable—queer quirks have valid explanations—and that this may be due to *his* background as a clinical psychologist. His social structures, on the other hand . . . . I know that no one, reader or reviewer, can expect perfection, but we can wish, can't we? Or ask for collaborations? Or can perfection come only from the rare genius who knows him or herself well enough to confine creativity to areas of strength? Nevertheless, Spruill's story is readable, and I can say that most readers will not be disappointed in the book.

Starry Messenger is subtitled **The Best of *Galileo***. It may be just that, though I haven't read enough issues of this new SF magazine to say. It *is* a collection of good, readable stories, the best of which may be M. Lucie Chin's "The Best Is Yet To Be," a tale of serial brain transplants and destiny. However, I found the most interesting part of the book to be the introduction, in which Charles Ryan, editor of both this book and *Galileo* itself, describes the magazine's beginnings, from a special SF issue of *Fiction*, through countless subscription-fulfillment hassles, to the present, all despite a profound lack of financial backing. *Galileo*'s existence and present health are signs of health in our field; to keep it healthy, this magazine—and the others, of course—deserve the support of all SF readers. Unfortunately, too many of you—not *you*! You're reading this mag, aren't you? You read others too, don't you?—read only books. Now, if only more of the magazine readers would give gift subscriptions for Christmas, birthdays, St. Valentine's

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Day, the Fourth of July, etc.

Paul Collins has been putting together anthologies of Australian science fiction for awhile now. **Alien Worlds** is his third. It contains eighteen stories, including excerpts from A. Bertram Chandler's latest Grimes novel, *Matilda's Stepchildren*, an intriguing explanation of the dinosaur die-off by David Lake, an uninspiring after-the-holocaust by Cherry Wilder, a neat depiction of man-machine combat symbiosis by Jack Wodhams, and a less than surprising bit of wizardry by Collins himself. The rest of the contributions vary in quality, just as do the few I list here, but on balance the book is well worth reading. Collins writes that "as a special offer to Analog readers, I'll let them have this anthology at Aust$8—it retails here at $12.95." To order, visit a bank to learn the current exchange rate and how best to pay and then write to Void Publications, P.O. Box 66, St. Kilda, Vic. 3182, Australia.

I'm writing this column about two weeks before Christmas 1979, which prompts me to advertise one of the side-benefits of being a book reviewer: you can fill your Christmas gift list easily and cheaply. Not that you slough off the dogs you think are utterly worthless in that way—just as Spider used to, I feed those to the woodstove—but books that don't appeal to you but might to another and books you get two or more copies of make perfect gifts. A case in point is **Barlowe's Guide to Extraterrestrials**. I got two copies of this one, and the second I immediately gift-wrapped for my-brother-the-artist. The book, edited by Ian Summers, is a showcase for the work of Douglas Barlowe, who has prepared detailed paintings of fifty SF aliens, from an Abyormenite (Hal Clement's *Cycle of Fire*) to a Velantian (Doc Smith's *Children of the Lens*), together with notes on anatomy, habitat, and culture. Barlowe's aliens often seem as if they were assembled from plastic kits, and they produce some cognitive dissonance, for they don't always agree with the renditions on old paperback covers, but they are an amazingly detailed, lifelike collection. The book is usefully amplified by a closing section that reproduces pencil sketches taken from preparatory work for the paintings, often showing the aliens in motion, and from an illustrated novel Barlowe is currently completing. I do expect we will see his aliens showing up at con masquerades.

John Gribbin is a science popularizer of an all too common brand—the sensationalizer. Not that I'm knocking sensation, for I use it myself and it provides an effective interest grabber. But it can be overdone, especially when the sensation of the science is presented as intimations of disaster. Sometimes, of course, disaster is the only implication one can fairly draw from the science, as with the discovery of an asteroid a mile wide heading straight for Earth; it would take a remarkable Pollyanna to publish an account of the asteroid stressing only the potential for diverting it into near-Earth orbit and exploiting it for its minerals. Often, there are two or more sensational aspects to the science, as in the case of recombinant DNA, where the possible risks and benefits are each enormous.

Gribbin isn't totally in love with disaster, for he can discuss black holes,

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white holes, and other astronomical phenomena in terms of purely intellectual sensation. But he does show a distinct fondness for disaster, as shown in his book on climatic change (*What's Wrong with Our Weather*, Scribner's, 1979) and in **The Death of the Sun**. Here he revives the argument of *The Jupiter Effect*, in which he and Stephen Plagemann predicted that a clumping of the planets toward one side of the sun during a period of peak solar activity in the early 1980's would further increase solar activity and thereby screw up Earth's weather and cause volcanic eruptions and earthquakes. This time around he brings in observations, not yet widely accepted, that solar activity can change the length of the terrestrial day by a few milliseconds (by affecting weather, and hence atmospheric mass distribution and angular momentum), and Chinese studies of the correlation between solar activity and day length. The Chinese researchers have observed definite correlations and found that the curves of both phenomena show matching periodicities, one which corresponds roughly to the 11.8-year orbit of Jupiter, one which slightly exceeds Saturn's 29.5-year orbital period, another which matches the 19.9-year period of Jupiter-Saturn conjunctions, and still another which matches the 179-year period for all-planet conjunctions. He then adds to this the idea that sunspots reflect changes in activity at deeper levels of the sun and says that though the Jupiter effect is speculation, he finds the evidence compelling.

Maybe. We'll know more soon enough, since the predicted upheavals are only a year or two away and Joseph Goodavage has used similar considerations to predict that the winter of 1980-81, especially the week around January 25, 1981, will be bitterly cold. I have my doubts, but I'm willing to wait and see; I won't be convinced by just one or two earthquakes, either, since we do have to leave room for coincidence. In the meantime, Gribbin's book seems worth reading for its discussion of recent developments in solar research, including the indications from studies of solar neutrinos that we don't really know what is going on inside the sun. I would, however, warn the reader to pay attention when Gribbin says an idea is controversial, speculative, or not yet widely accepted. He bases his predictions largely on such ideas and an uncritical reader may too readily believe.

A great deal has been written about flying saucers, ESP, and the like, most of it in a credulous style that immediately makes the rationalist, the skeptic, bridle and call it all nonsense. Such a reaction is natural enough—when someone insists a thing has to be true and you are a jerk, a reactionary, a traitor to the species, and worse for not seeing its truth right away, you tend to back off, to put it mildly. But the reaction is in some ways unfortunate. The truth of an idea is *not* a function of its proponents' manners. In all fairness, an idea should be evaluated solely on the twin bases of the evidence pertaining to it and its usefulness in uncovering further truths (a theory need not be true to be valuable—it need only lead to truth).

For this reason, I am happy to see Karl Brunstein's **Beyond the Four Dimensions**. Brunstein is a physicist,

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a specialist in cosmic rays, with a sound reputation. He knows how to handle data, and in his book he shows us what can be done if we "take as our basic premise that man is generally reliable in his perceptions, . . . accept the various phenomena associated with UFOs as if they were just so much more observational data" and "let our data dictate to us how we should modify our views to encompass *them*" (pp. xiii-xiv, his emphasis). I don't agree that perception is all that reliable—the psychologists have demonstrated the contrary quite effectively—but I accept his premise for the sake of argument.

To reinforce his approach, he reviews the history of science to show how great advances are often the products of individuals who have set aside the blinders of tradition or convention. This is true enough, but it seems a mite overweening for Brunstein to put himself in the company of Copernicus, Bruno, and Einstein, an assignment that properly belongs to history. More to the point is his discussion of how science provides no ultimate explanations. "The mystical has been pushed back a few steps from the phenomena to allow for the intermediate use of our human brand of 'rational' description" but still no explanation does "not call ultimately upon de facto magical hypotheses" (p. 18).

He then turns to the UFOs to find that the universality of associated humanoids suggests a surprising nonrandomness to evolution and that UFO behavior suggests the use of a fifth dimension, an axis orthogonal to the four we know of space and time. To complete the picture, he turns to ESP. "If we are to speak of a fifth dimension, we must provide a totally new physical force to go along with it, one that has not yet found itself a comfortable niche in science. A likely candidate for this role is the decidedly anomalous force . . . felt . . . in parapsychology" (p. 150).

Not surprisingly, Brunstein's argument is not compelling, for in accepting data for their value in provoking thought, he neglects the quality of the data. In particular, he seems unaware of how many ESP experiments have later been shown to be flawed. Nevertheless, the phenomena he exploits are common enough to deserve serious attention even if no adequate experimental designs have yet been devised, and his argument *is* intriguing. If a complete description of the universe does indeed require five (or more) dimensions, and if this description is attainable by human minds evolved in the more limited four-dimensional slice of the universe, there is hope of exceeding the speed of light, time travel, parapsychological powers, and parallel worlds. Brunstein's book is therefore worth reading. Fortunately, the book is also readable, for the man knows how to handle English, he is thoughtful, undogmatic, and he is a refreshing contrast to much of the garbage published on fringe topics.

GUEST BOOK REVIEW
BY RUTH B. KAPLAN

The Ape's Reflexion,
Adrian J. Desmond, Dial Press, 288 pp., $10.95.

Ever since Washoe demonstrated her ability to use the American Sign Language, man's self-definition as

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superior to animals has been under a winning siege. Our assumption that first contact with extraterrestrials will consist of a direct "Take us to your leader," has been belied by the stalwart resistance to communications with the aliens in our backyards—chimpanzees. This link between terrestrial interspecies communication and the quest for contact with extraterrestrials makes this book interesting reading for anyone concerned with science fiction. Desmond has presented a comprehensive examination of the continuing conflict between attempts to place man at the head of the animal kingdom, and efforts to integrate him into it, as an equal member.

Desmond disregards all objections to the classification of chimps as sentient beings, and assumes them to be our sibling species. Summarizing the developments in communication with the chimps, he points out that although apes use sign language, we cannot be sure they have the same concept as we do of the word's meanings. If, after ten years of trying to communicate with a species as similar as chimps, we do not have an accurate picture of their perception of the language, how can we expect to have cultural exchange with extraterrestrials?

The point is that while we are not teaching chimpanzees strictly human language, we are teaching them something that places them in a difficult position in a society that has one set of laws and morals for humans, and another for animals. In which category are the sentient apes? The most moving example of the legal dilemma that involves such creatures is that of Koko, the gorilla who "speaks" American Sign Language. The battle for "ownership" of this valuable "animal" highlights the conflict between our belief in basic "human" rights for sentient beings, and the automatic definition of animals as nonsentient.

Indeed, the consensus seems to be that by teaching apes language, we elevate them to a human level. In order to delve into the context of this idea, Desmond digresses into a lengthy history of the debates among evolutionists over the relative rank of humans and apes. These historical passages, which appear at several places in the book, pall rapidly, and often destroy the continuity of Desmond's thesis amidst discussion of outdated ideas.

Desmond uses symbolic abstraction as a criterion for apes' language use. His conclusion is that while apes' mental abstractions are probably not identical to humans', they are close enough to allow communication. Cross-modal matching, a test of symbol acquisition, requires the chimpanzee to recognize an object by feel or sight alone. In mapping the chimps' reality, it has been found that they have a tendency to deal only in the active immediate, which may or may not be due to environmental conditions. Contemplative thought, though perhaps not an exclusively human ability, may be the product of a human environment.

Desmond then demolishes the definition of man as uniquely capable of language use. Language is evidently not a purely human development in the neocortical left brain hemisphere, but is more deeply rooted in primate limbic structure. Conversely,

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experiments with rhesus monkeys show that they exhibit some neocortical lateralization.

Man has spent the last century guided by the belief that man is superior to other creatures, and much of the primate behavior data today is still interpreted by a human yardstick. This human standard is inherently inappropriate to apes, since they are not ancestors of humans, but a separate species, occupying a different niche in evolutionary adaptation. Our penchant for comparing incomparable species will certainly inhibit any attempts at communication with extraterrestrials, much as it has with apes.

Desmond's discussion of recent advances in our knowledge of chimp behavior continues, including the alarming predatory behavior of the Gombe chimpanzee and gibbon colony in Africa. The chimps' cooperative hunting turned inexplicably to the gibbons, and finally to murdering their own kind, within the colony. Besides proving that man is not unique in his warlike tendencies, this holocaust caused the observers to conclude that they had upset the social structure of both species, by encouraging them to live in unnaturally close proximity. However, Desmond once again fails to extrapolate the moral lesson here; this is the price for interference in a nonhuman society. Will we remember this lesson when we first contact extraterrestrial cultures? Desmond, the historian, refrains from even asking, much less attempting to answer, the question.

Having established the complexity of social relationships well within the capacity of the chimpanzees, Desmond explains that chimps do not use verbal language because they can talk with their eyes. Why then, did man need to develop verbal language? According to Desmond, social altruism was a key factor in human evolution, requiring more complex symbolism than that offered by eye language. Indeed, the chimps' sense of "fair play" seems different from that of humans. But if Desmond believes this, is he not again setting off humans as special? We are left at the end of the book with a very muddled view of Desmond's opinion.

Desmond's theme is nothing short of landmark. Previous books on the subject of ape sentience (Premack, *Intelligence in Ape and Man;* Linden, *Apes, Men, and Language)* only briefly touch on the problem of man's imposition of his own human definitions and ethics upon sentient apes. But Desmond does not take the idea far enough, to its ultimate important conclusions. He remains the historian, when he could be creating new ideas for future history.

John W. Campbell defined a good alien as one that "thinks as well as a human, but differently." Chimpanzees fit this definition, providing a proving ground for communication with aliens. If we do not solve the moral and ethical questions, and communications difficulties that we have in dealing with chimpanzees, they will catch up with us at first contact. We can solve them now, while we have time, or we can wait until we have met the extraterrestrials, and have no time for hesitation—for then, every move, or lack thereof, will be crucial. ■

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BRASS TACKS

Dear Stan,

Unless somebody else has already written to you about this, may I have a few words in Analog to make an announcement that will interest many of your readers?

As you know, the Viking lander on Mars is capable of transmitting its invaluable data to Earth for another ten years or so—but NASA will soon run out of the money needed for staff and facilities to receive, and there is no realistic prospect of Congress making the relatively trivial appropriation that would suffice to protect this investment in science that we the people have made. Other important activities in space are also being curtailed, or about to be, for the same reason.

Therefore the San Francisco section of the American Astronautical Society has established the Viking Fund. The goal is to raise one million dollars (that's about half a cent per American citizen) by 20 July 1980—an anniversary that all of us will instantly recognize—to help NASA continue its work on Mars and elsewhere.

Success in this effort will, among other desirable things, be a clear message to Congress, in an election year, that a great many people do still favor a strong space program; it will also be a step toward private enterprise out yonder, and thus toward giving us, as individuals, a voice in what is to be done.

Contributions ($1 minimum) should be sent to the Viking Fund, P.O. Box 7205, Menlo Park, California 94025. They are tax deductible and will be acknowledged. Contributors will be kept informed of progress, and will be invited to the dedication of the fund to NASA in Washington during July 1980.

POUL ANDERSON

Dear Mr. Easton:

I was quite disturbed by your book review in the March Analog. In talking about *The Ruins of Isis* you state that it is "feminist, but at the same time unusually rational and realistic." You seem to be implying that feminism is somehow irrational and unrealistic. I don't know if you are simply disturbed by something you read recently (Joanna Russ and especially Suzy McKee Charnas are two possibilities) or if you are genuinely against feminism. If the former is true you have chosen your words very poorly and you are likely in either case to be attacked by all of the handful of women who read Analog (the female SF fans I know avoid it like the plague). If the latter is true, I suggest you go out and read some stories by James Schmitz or John Varley. Without mentioning feminism per se, they have created egalitarian societies

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with strong female characters.

I also disliked your swipe at comic book readers. Without defending the format of the recent overpriced illustrated novels, I do wish to defend myself. I grew up on comic books, and naturally grew from them into science fiction. I still read them occasionally (I'm 22). I considered myself a lot more literate than my schoolmates, who read football stories or nothing at all.

In closing I must conclude that although I like your general format and usually agree with your opinions on books, I wish you would be more careful with your offhand remarks.

JEFFREY S. KASTEN

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ANSWER TO KASTEN:

I am not *against feminism, since I am* for *fairness. I* am *against rabid or fanatical expressions of anything—from feminism to politics to religion—and all too many feminists express themselves as might a rabid dog. Varley is a fine counterexample. Schmitz is not—while his societies* are *egalitarian, he treats his heroines (sometimes) in a distinctly sexist way.*

Comic books? I like 'em too! What I was taking the swipe at was people who read only *comics and publishers who pander to them. You clearly don't read only comics, and you shouldn't feel swiped at!*

TOM EASTON

Dear Dr. Schmidt:

L.M. Janifer's conniption fit (Brass Tacks, February, 1980) is remarkable for its distortion of values. On the one hand, he boils with fury because I pointed out shortcomings in Poul Anderson and other writers, and he is distressed that my influence (!) might prevent some readers from buying Mr. Anderson's books. On the other hand, he casually remarks, in closing, that there are "a good many holes" in my case for cryonics, apparently never thinking that, if he has any influence and happens to be wrong, some readers may lose their *lives.*

If there are *any* holes in my case for cryonics, then Janifer must know something important that has not been pointed out to me in many years of wide-ranging debate. If he has such knowledge, surely he must recognize a duty to share it.

Cryonicists are not zealots, fanatics, or crusaders. We admit our approach to indefinitely extended life is unsafe and uncertain; it is simply the best and most realistic available. If anyone can show us a better alternative, I'll be among the first to switch.

Meanwhile, I'll continue to work (and pay) to improve our chances through cryonics, and to convince others to help themselves and us.

R.C.W. ETTINGER

Dear Sir:

In response to your editorial concerning "Quality Control," I think you glossed over the main reason for the phenomena you were complaining about when you said that formal education was a small part of it.

There was a time in formal, and informal also, education when the pupil was responsible for acquiring enough information to earn a passing grade. This information came from a teacher, a book, a slide presentation, a movie, etc. But it was his responsibility; i.e.,

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make notes, make it sink into his brain, or otherwise retain enough of it to pass an examination. In this way, the pupil knew that it was only by his own efforts that he was going to earn passing grades, get promoted, and eventually graduate. Necessarily, therefore, most pupils understood a form of "quality control"; either do your work or you don't pass, graduate, etc. This carried forward into the job world also. If you didn't do the job correctly, you lost it.

Slowly, however, the instructors of the student teachers became obsessed with a dictum of the sociologist-cum-psychologist theory that failing a student and thereby preventing him from being promoted was a "traumatic experience" and therefore bad for the psyche of the student. Whereupon "Progressive Education" (a pejorative expression) came into being. This resulted in the graduation from high school of students who couldn't read, write, speak, or think coherently, logically or any other way. No wonder they didn't care about the job they were doing. After all, didn't they graduate school without caring about learning anything? When major universities have to have remedial non-credit courses in English in order for their students to read their assignments, what kind of "Quality Control" has been in effect in the education system?!!

LARRY ROTHSTEIN

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Indeed—but which came first, the chicken or the egg? Incidentally, I can think of at least one kind of education that still has a very potent form of quality control built in. In flying instruction, the student must do a good deal of his flying "solo"—and while doing so he has sole responsibility for his own survival. *Now, how might we build an analog of that into other kinds of education?*

Dear Dr. Schmidt:

Jerry Pournelle's article relating to the treaty for the peaceful uses of space rests on a fallacious assumption. We already *do* have agreements of this kind governing the use of Antarctica and are well on the way to a successful conclusion to a similar treaty on the use of the open sea. The provisions on "innocent passage," research, fishing and exploitation of the continental shelves have been agreed to. Only mining (or rather the control of the U.N. body licensing mining) remains to be worked out. The provisions of the treaty generally agreed to are being implemented even before there is a formal treaty.

The history of unregulated exploitation of newly discovered areas in the 15th through the 19th centuries is a known disaster. It included many declared and undeclared wars between various exploiters, massacres, etc. The treaties and agreements governing Antarctica and the sea do not eliminate greed and competition, just the violent and unrestrained expression thereof.

It might pay off to try the new way in space as well. The old way is sure to bring about wars and waste.

MICHAEL COHN

Dear Dr. Schmidt:

In the July 1979 issue, I read with interest G. Harry Stine's column, "Biocybernetics II." I constructed a similar device in my undergraduate engineering days in the early seventies. I

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am now sorry that I did not continue the development of the unit, since there seems to have been no patent limitations. My unit was based on the same principles on which Flanagan's and Stine's device worked, but was somewhat more advanced due to the technology used. The unit which I am now constructing for my father uses current technology. For those of your readers interested in more technical information, I suggest that they consult the article, "Electronics for Speech and Hearing Therapy," in the September, 1967 *Electronics World*. I would also be interested in hearing from those who are interested in developing this principle.

RADCLIFFE CUTSHAW
DESIGN ENGINEER

Siaius Systems
2004 Robinson Road
Knoxville, TN 37919

Dear Stan:

This is the year for public supported funding of new space program starts. The Congress, the Senate, and the Office of Management and Budget have again failed to adequately fund the VOIR radar mission to Venus, the Solar Electric Propulsion System (SEPS) for the Halley/Tempel 2 cometary rendezvous and the Interim Upper State (IUS) for the Space Shuttle. They are further delaying space exploration, as you well know, with cutbacks for funding for the Space Shuttle. Except for the Voyager flyby of Saturn and the launch of the Space Shuttle, there is going to be a very real lack of NASA planetary and cometary spacecraft exploration this decade.

Letter writing campaigns have failed to make a lasting impression on President Carter and the OMB as to our strong and continued support of NASA. *Star Trek* fan letters named the first shuttle *Enterprise* as well as passed the FY 1978 budget for the Jupiter Orbiter Probe. Yet, today, the OMB is still cutting back on NASA space program starts.

I feel that we need to respond through monetary support for these program starts from you, the grass roots movement, in order to more directly prove to President Carter and the OMB that we want increased NASA funding—even if we have to do it ourselves! I am, therefore, setting up a fund, The Solar System Exploration Fund, to support the IUS/SEPS/VOIR missions. All contributions (minimum of one dollar) will be acknowledged and a monthly newsletter will be sent out to all contributors on the progress of the fund. Please include a S.A.S.E. If you are unable to contribute a donation would you please send a letter giving your reasons why we should expand the space program. Depending on the amount of mail received, I will send out a weekly package of letters received to President Carter.

All checks and money orders should be made out to: The Solar System Exploration Fund. Address them to: Chester Twarog, Chairman, Solar System Exploration Fund, 1350 Macon Street, Apt. 304, Aurora, CO 80010.

The amount collected by mid-September 1980, will be presented to NASA along with a list of all who have contributed. If we are successful this year, I will recommend that we establish a yearly fund drive for the exploration of our solar system.

CHESTER TWAROG
1350 Macon St. #304
Aurora, CO 80010

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It's time again to thank all of you who sent in your votes for 1979, and to report the results. I'm pleased to report, first, that the number of votes this year was appreciably higher than last year. I think we'll try it once more on a whole-year basis, come December, and if the trend toward increased participation continues, maybe we'll try a twice-a-year poll next year.

We used the same scoring system as last year: a first-place vote counted as three points, a second as two, and a third as one. Thus, in general, a high total score indicates high popularity. The numbers given for comparison in the listing below are ratings on a scale of 0 to 10, obtained by dividing each entry's total score by the score it would have achieved had everybody voting assigned it first place, and multiplying that fraction by 10. Please note that this system, while it does provide a way to make comparisons within a group, tends to produce lower scores in groups with many entries (short stories) than in groups with fewer (such as novelettes or covers). Serial scores tend to run unusually (and possibly misleadingly) high because *every* entry was normally ranked either first, second, or third, while a short story might not appear at all on many ballots. (A few readers saw no value in voting on serials, since there were only three—but please note that every serial occupies a good deal of the year, so it *is* to your advantage to let us know as much as possible about your preferences among them.)

Here are the results:

Serials

1. **Titan,** John Varley (7.68)
2. **Class Six Climb,** William E. Cochrane (6.51)
3. **The Visitors,** Clifford D. Simak (6.16)

Novelettes

1. "Songhouse," Orson Scott Card (5.34)
2. "The Locusts," Larry Niven and Steve Barnes (3.05)
3. "The Moon Goddess and the Son," Donald Kingsbury (2.47)
4. "Beer Run," Michael McCollum (2.15)
5. "Duty, Honor, Planet," Michael McCollum (1.89)

Short Stories

1. "Can These Bones Live?" Ted Reynolds (2.68)
2. "Breaking the Game," Orson Scott Card (2.10)
3. "In Adam's Fall," Jayge Carr (2.06)
4. "Old Friends," Kevin O'Donnell, Jr. (1.17)
5. "...And Master of One," Ian Stewart (0.98)

Articles

1. "Build Your Own A-Bomb and Wake Up the Neighborhood," George W. Harper (4.48)
2. "The Spaceport," Roger Arnold and Donald Kingsbury (3.79)
3. "Funding the Future," M. David Stone (1.56)
4. "Future Food," David Ritchie (1.52)
5. "American Enthusiasm for Spaceflight," William Sims Bainbridge and Richard Wyckoff (1.42)

Covers

1. January: Paul Lehr, for **Titan** (4.04)
2. December: Vincent DiFate, for "The Moon Goddess and the Son" (2.93)
3. July: Robert McCall, for Apollo 11 Anniversary (2.76)

A few comments may be in order. It's fascinating to watch how varied your tastes are: virtually every entry in every category received at least some votes in every place. Even allowing for the effect noted above, the preferences were least distinct among the serials, with every one of the three having quite a few vocal proponents. In the other categories, there were small numbers of clear standouts. "Songhouse" literally ran away with the novelette division. "Build Your Own A-Bomb" swept the articles almost as decisively, though "The Spaceport" made a very strong second place showing; both were far ahead of the competition. Among the short stories there were three clear standouts, rather close to each other. And it's interesting to notice that Michael McCollum, a new writer with two Analog stories in 1979, placed in the top five with both of them.

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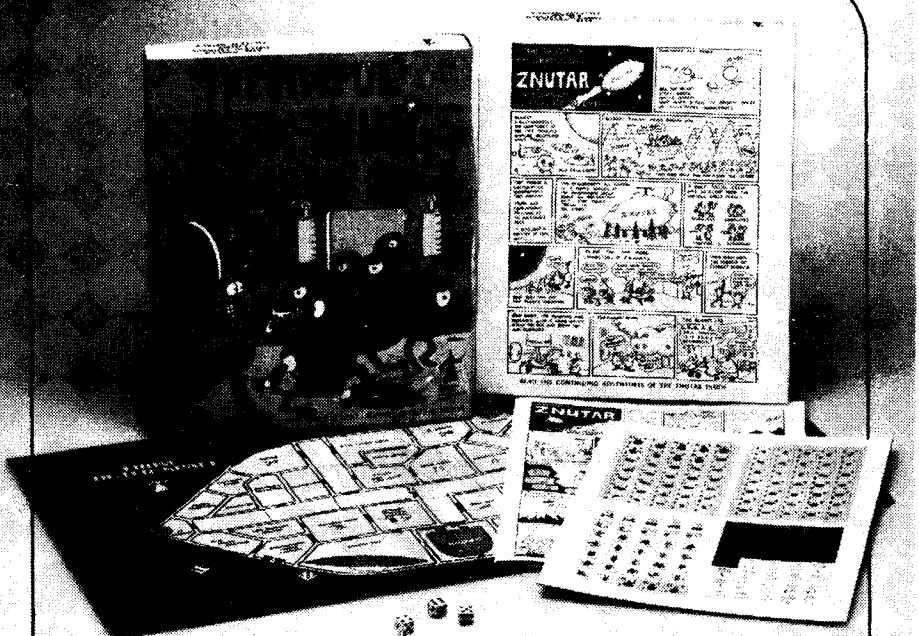

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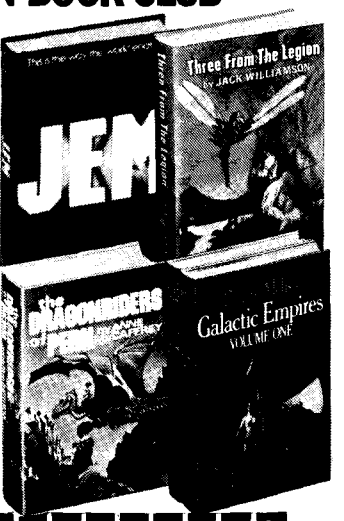

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